Appendix A Air Quality and GHG Background and Modeling Data

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Air Quality and Greenhouse Gas Appendix

Air Quality and Greenhouse Gas Background and Modeling Data

AIR QUALITY

Climate/Meteorology

SOUTH COAST AIR BASIN

The project site lies in the South Coast Air Basin (SoCAB), which includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties. The SoCAB is in a coastal plain with connecting broad valleys and low hills and is bounded by the Pacific Ocean in the southwest quadrant, with high mountains forming the remainder of the perimeter. The general region lies in the semi-permanent high-pressure zone of the eastern Pacific. As a result, the climate is mild, tempered by cool sea breezes. This usually mild weather pattern is interrupted infrequently by periods of extremely hot weather, winter storms, and Santa Ana winds (South Coast AQMD 2005).

Temperature and Precipitation

The annual average temperature varies little throughout the SoCAB, ranging from the low to middle 60s, measured in degrees Fahrenheit (°F). With a more pronounced oceanic influence, coastal areas show less variability in annual minimum and maximum temperatures than inland areas. The climatological station nearest to the project site with temperature data is the Irvine climatological station. The lowest average temperature is reported at 45.4 °F in December, and the highest average temperature is 84.3°F in August (USA.COM 2021).

In contrast to a very steady pattern of temperature, rainfall is seasonally and annually highly variable. Almost all rain falls from October through April. Summer rainfall is normally restricted to widely scattered thundershowers near the coast, with slightly heavier shower activity in the east and over the mountains. Rainfall historically averages 13.58 inches per year in the project area (USA.COM 2021).

Humidity

Although the SoCAB has a semiarid climate, the air near the earth's surface is typically moist because of the presence of a shallow marine layer. Except for infrequent periods when dry, continental air is brought into the SoCAB by offshore winds, the "ocean effect" is dominant. Periods of heavy fog, especially along the coast, are frequent. Low clouds, often referred to as high fog, are a characteristic climatic feature. Annual average humidity is 70 percent at the coast and 57 percent in the eastern portions of the (South Coast AQMD 2005).

Wind

Wind patterns across the south coastal region are characterized by westerly or southwesterly onshore winds during the day and by easterly or northeasterly breezes at night. Wind speed is somewhat greater during the dry summer months than during the rainy winter season.

Between periods of wind, periods of air stagnation may occur, both in the morning and evening hours. Air stagnation is one of the critical determinants of air quality conditions on any given day. During the winter and fall months, surface high-pressure systems over the SoCAB, combined with other meteorological conditions, can result in very strong, downslope Santa Ana winds. These winds normally continue a few days before predominant meteorological conditions are reestablished.

The mountain ranges to the east affect the transport and diffusion of pollutants by inhibiting their eastward transport. Air quality in the SoCAB generally ranges from fair to poor and is similar to air quality in most of coastal southern California. The entire region experiences heavy concentrations of air pollutants during prolonged periods of stable atmospheric conditions (South Coast AQMD 2005).

Inversions

In conjunction with the two characteristic wind patterns that affect the rate and orientation of horizontal pollutant transport, there are two similarly distinct types of temperature inversions that control the vertical depth through which pollutants are mixed. These are the marine/subsidence inversion and the radiation inversion. The combination of winds and inversions are critical determinants in leading to the highly degraded air quality in summer and the generally good air quality in the winter in the project area (South Coast AQMD 2005).

Air Quality Regulations

The proposed project has the potential to release gaseous emissions of criteria pollutants and dust into the ambient air; therefore, it falls under the ambient air quality standards promulgated at the local, state, and federal levels. The project site is in the SoCAB and is subject to the rules and regulations imposed by the South Coast Air Quality Management District (South Coast AQMD). However, South Coast AQMD reports to California Air Resources board (CARB), and all criteria emissions are also governed by the California and national Ambient Air Quality Standards (AAQS). Federal, state, regional, and local laws, regulations, plans, or guidelines that are potentially applicable to the proposed project are summarized below.

AMBIENT AIR QUALITY STANDARDS

The Clean Air Act (CAA) was passed in 1963 by the US Congress and has been amended several times. The 1970 Clean Air Act amendments strengthened previous legislation and laid the foundation for the regulatory scheme of the 1970s and 1980s. In 1977, Congress again added several provisions, including nonattainment requirements for areas not meeting National AAQS and the Prevention of Significant Deterioration program. The 1990 amendments represent the latest in a series of federal efforts to regulate the protection of air quality in the United States. The CAA allows states to adopt more stringent standards or to include other pollution species. The California Clean Air Act (CCAA), signed into law in 1988, requires all areas of the state to achieve

and maintain the California AAQS by the earliest practical date. The California AAQS tend to be more restrictive than the National AAQS, based on even greater health and welfare concerns.

These National AAQS and California AAQS are the levels of air quality considered to provide a margin of safety in the protection of the public health and welfare. They are designed to protect "sensitive receptors" most susceptible to further respiratory distress, such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise. Healthy adults can tolerate occasional exposure to air pollutant concentrations considerably above these minimum standards before adverse effects are observed.

Both California and the federal government have established health-based AAQS for seven air pollutants. As shown in Table 1, these pollutants include ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), coarse inhalable particulate matter (PM_{10}), fine inhalable particulate matter ($PM_{2.5}$), and lead (Pb). In addition, the state has set standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. These standards are designed to protect the health and welfare of the populace with a reasonable margin of safety.

Table 1 Ambient Air Quality Standards for Criteria Pollutants

Pollutant	Averaging Time	California Standard[1]	Federal Primary Standard[2]	Major Pollutant Sources
Ozone (O_3)[3]	1 hour	0.09 ppm	*	Motor vehicles, paints, coatings, and solvents.
	8 hours	0.070 ppm	0.070 ppm	
Carbon Monoxide (CO)	1 hour	20 ppm	35 ppm	Internal combustion engines, primarily gasoline-powered motor vehicles.
	8 hours	9.0 ppm	9 ppm	
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm	0.053 ppm	Motor vehicles, petroleum-refining operations, industrial sources, aircraft, ships, and railroads.
	1 hour	0.18 ppm	0.100 ppm	
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	*	0.030 ppm	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.
	1 hour	0.25 ppm	0.075 ppm	
	24 hours	0.04 ppm	0.14 ppm	
Respirable Coarse Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 µg/m^3	*	Dust and fume-producing construction, industrial, and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).
	24 hours	50 µg/m^3	150 µg/m^3	
Respirable Fine Particulate Matter ($PM_{2.5}$)[4]	Annual Arithmetic Mean	12 µg/m^3	12 µg/m^3	Dust and fume-producing construction, industrial, and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).
	24 hours	*	35 µg/m^3	

Table 1 Ambient Air Quality Standards for Criteria Pollutants

Pollutant	Averaging Time	California Standard[1]	Federal Primary Standard[2]	Major Pollutant Sources
Lead (Pb)	30-Day Average	1.5 µg/m^3	*	Present source: lead smelters, battery manufacturing & recycling facilities. Past source: combustion of leaded gasoline.
	Calendar Quarter	*	1.5 µg/m^3	
	Rolling 3-Month Average	*	0.15 µg/m^3	
Sulfates (SO_4)[5]	24 hours	25 µg/m^3	*	Industrial processes.
Visibility Reducing Particles	8 hours	ExCo =0.23/km visibility of 10≥ miles	No Federal Standard	Visibility-reducing particles consist of suspended particulate matter, which is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size and chemical composition, and can be made up of many different materials such as metals, soot, soil, dust, and salt.
Hydrogen Sulfide	1 hour	0.03 ppm	No Federal Standard	Hydrogen sulfide (H_2S) is a colorless gas with the odor of rotten eggs. It is formed during bacterial decomposition of sulfur-containing organic substances. Also, it can be present in sewer gas and some natural gas and can be emitted as the result of geothermal energy exploitation.
Vinyl Chloride	24 hours	0.01 ppm	No Federal Standard	Vinyl chloride (chloroethene), a chlorinated hydrocarbon, is a colorless gas with a mild, sweet odor. Most vinyl chloride is used to make polyvinyl chloride (PVC) plastic and vinyl products. Vinyl chloride has been detected near landfills, sewage plants, and hazardous waste sites, due to microbial breakdown of chlorinated solvents.

Source: CARB 2016.

Notes: ppm: parts per million; µg/m^3: micrograms per cubic meter

* Standard has not been established for this pollutant/duration by this entity.

1 California standards for O_3, CO (except 8-hour Lake Tahoe), SO_2 (1 and 24 hour), NO_2, and particulate matter (PM_{10}, $PM_{2.5}$, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2 National standards (other than O_3, PM, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The O_3 standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.

3 On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

4 On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 µg/m^3 to 12.0 µg/m^3. The existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at 35 µg/m^3, as was the annual secondary standard of 15 µg/m^3. The existing 24-hour PM_{10} standards (primary and secondary) of 150 µg/m^3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

5 On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. The 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

California has also adopted a host of other regulations that reduce criteria pollutant emissions, including:

- AB 1493: Pavley Fuel Efficiency Standards
- Title 20 California Code of Regulations (CCR): Appliance Energy Efficiency Standards
- Title 24, Part 6, CCR: Building and Energy Efficiency Standards
- Title 24, Part 11, CCR: Green Building Standards Code

CRITERIA AIR POLLUTANTS

The air pollutants emitted into the ambient air by stationary and mobile sources are regulated by federal and state law. Air pollutants are categorized as primary or secondary pollutants. Primary air pollutants are those that are emitted directly from sources and include CO, VOC, NO_2, SO_X, PM_{10}, $PM_{2.5}$, and Pb. Of these, CO, SO_2, NO_2, PM_{10}, and $PM_{2.5}$ are "criteria air pollutants," which means that ambient air quality standards (AAQS) have been established for them. VOC and oxides of nitrogen (NO_x) are air pollutant precursors that form secondary criteria pollutants through chemical and photochemical reactions in the atmosphere. Ozone (O_3) and NO_2 are the principal secondary pollutants. A description of each of the primary and secondary criteria air pollutants and their known health effects is presented below.

Carbon Monoxide (CO) is a colorless, odorless, toxic gas produced by incomplete combustion of carbon substances, such as gasoline or diesel fuel. CO is a primary criteria air pollutant. CO concentrations tend to be the highest during winter mornings with little to no wind, when surface-based inversions trap the pollutant at ground levels. Because CO is emitted directly from internal combustion, engines and motor vehicles operating at slow speeds are the primary source of CO in the SoCAB. The highest ambient CO concentrations are generally found near traffic-congested corridors and intersections. The primary adverse health effect associated with CO is interference with normal oxygen transfer to the blood, which may result in tissue oxygen deprivation (South Coast AQMD 2005, USEPA 2021). The SoCAB is designated as being in attainment under the California AAQS and attainment (serious maintenance) under the National AAQS (CARB 2021b).

Volatile Organic Compounds (VOC) are compounds composed primarily of atoms of hydrogen and carbon. Internal combustion associated with motor vehicle usage is the major source of hydrocarbons. Other sources of VOCs include evaporative emissions associated with the use of paints and solvents, the application of asphalt paving, and the use of household consumer products such as aerosols. There are no ambient air quality standards established for VOCs. However, because they contribute to the formation of ozone (O_3), South Coast AQMD has established a significance threshold for this pollutant (South Coast AQMD 2005).

Nitrogen Oxides (NO_x) are a byproduct of fuel combustion and contribute to the formation of O_3, PM_{10}, and $PM_{2.5}$. The two major forms of NO_x are nitric oxide (NO) and nitrogen dioxide (NO_2). The principal form of NO_2 produced by combustion is NO, but NO reacts with oxygen to form NO_2, creating the mixture of NO and NO_2 commonly called NO_x. NO_2 acts as an acute irritant and, in equal concentrations, is more injurious than NO. At atmospheric concentrations, however, NO_2 is only potentially irritating. There is some indication of a relationship between NO_2 and chronic pulmonary fibrosis. Some increase in bronchitis in children (two and three years old) has also been observed at concentrations below 0.3 part per million (ppm). NO_2 absorbs blue light; the result is a brownish-red cast to the atmosphere and reduced visibility. NO is a colorless, odorless gas formed from atmospheric nitrogen and oxygen when combustion takes place under high temperature and/or high pressure (South Coast AQMD 2005, USEPA 2021). The SoCAB is designated as an attainment (maintenance) area under the National AAQS and attainment area under the California AAQS (CARB 2021b).

Sulfur Dioxide (SO_2) is a colorless, pungent, irritating gas formed by the combustion of sulfurous fossil fuels. It enters the atmosphere as a result of burning high-sulfur-content fuel oils and coal and from chemical

processes at chemical plants and refineries. Gasoline and natural gas have very low sulfur content and do not release significant quantities of SO_2 (South Coast AQMD 2005, USEPA 2021). When sulfur dioxide forms sulfates (SO_4) in the atmosphere, together these pollutants are referred to as sulfur oxides (SO_X). Thus, SO_2 is both a primary and secondary criteria air pollutant. At sufficiently high concentrations, SO_2 may irritate the upper respiratory tract. At lower concentrations and when combined with particulates, SO_2 may do greater harm by injuring lung tissue. The SoCAB is designated as attainment under the California and National AAQS (CARB 2021b).

Suspended Particulate Matter (PM_{10} and $PM_{2.5}$) consists of finely divided solids or liquids such as soot, dust, aerosols, fumes, and mists. Two forms of fine particulates are now recognized and regulated. Inhalable coarse particles, or PM_{10}, include the particulate matter with an aerodynamic diameter of 10 microns (i.e., 10 millionths of a meter or 0.0004 inch) or less. Inhalable fine particles, or $PM_{2.5}$, have an aerodynamic diameter of 2.5 microns (i.e., 2.5 millionths of a meter or 0.0001 inch) or less. Particulate discharge into the atmosphere results primarily from industrial, agricultural, construction, and transportation activities. However, wind action on arid landscapes also contributes substantially to local particulate loading (i.e., fugitive dust). Both PM_{10} and $PM_{2.5}$ may adversely affect the human respiratory system, especially in people who are naturally sensitive or susceptible to breathing problems (South Coast AQMD 2005).

The US Environmental Protection Agency's (EPA) scientific review concluded that $PM_{2.5}$, which penetrates deeply into the lungs, is more likely than PM_{10} to contribute to health effects and at concentrations that extend well below those allowed by the current PM_{10} standards. These health effects include premature death and increased hospital admissions and emergency room visits (primarily the elderly and individuals with cardiopulmonary disease); increased respiratory symptoms and disease (children and individuals with cardiopulmonary disease such as asthma); decreased lung functions (particularly in children and individuals with asthma); and alterations in lung tissue and structure and in respiratory tract defense mechanisms (South Coast AQMD 2005). There has been emerging evidence that even smaller particulates with an aerodynamic diameter of <0.1 microns or less (i.e., ≤ 0.1 millionths of a meter or <0.000004 inch), known as ultrafine particulates (UFPs), have human health implications, because UFPs toxic components may initiate or facilitate biological processes that may lead to adverse effects to the heart, lungs, and other organs (South Coast AQMD 2013). However, the EPA or CARB have yet to adopt AAQS to regulate these particulates. Diesel particulate matter (DPM) is classified by the CARB as a carcinogen (CARB 1998). Particulate matter can also cause environmental effects such as visibility impairment,[1] environmental damage,[2] and aesthetic damage[3] (South Coast AQMD 2005; USEPA 2021). The SoCAB is in nonattainment and serious nonattainment for $PM_{2.5}$ under the California and National AAQS, respectively. For PM_{10}, the SoCAB is nonattainment under the California AAQS and in attainment (serious maintenance) under the National AAQS (CARB 2021b).[4]

[1] $PM_{2.5}$ is the main cause of reduced visibility (haze) in parts of the United States.

[2] Particulate matter can be carried over long distances by wind and then settle on ground or water, making lakes and streams acidic; changing the nutrient balance in coastal waters and large river basins; depleting the nutrients in soil; damaging sensitive forests and farm crops; and affecting the diversity of ecosystems.

[3] Particulate matter can stain and damage stone and other materials, including culturally important objects such as statues and monuments.

[4] CARB approved the South Coast AQMD's request to redesignate the SoCAB from serious nonattainment for PM_{10} to attainment for PM_{10} under the National AAQS on March 25, 2010, because the SoCAB did not violate federal 24-hour PM_{10} standards from

Ozone (O_3) is commonly referred to as "smog" and is a gas that is formed when VOCs and NO_x, both by-products of internal combustion engine exhaust, undergo photochemical reactions in the presence of sunlight. O_3 is a secondary criteria air pollutant. O_3 concentrations are generally highest during the summer months when direct sunlight, light winds, and warm temperatures create favorable conditions for the formation of this pollutant. O_3 poses a health threat to those who already suffer from respiratory diseases as well as to healthy people. Breathing O_3 can trigger a variety of health problems, including chest pain, coughing, throat irritation, and congestion. It can worsen bronchitis, emphysema, and asthma. Ground-level O_3 also can reduce lung function and inflame the linings of the lungs. Repeated exposure may permanently scar lung tissue. O_3 also affects sensitive vegetation and ecosystems, including forests, parks, wildlife refuges, and wilderness areas. In particular, O_3 harms sensitive vegetation during the growing season (South Coast AQMD 2005; USEPA 2021). The SoCAB is designated as extreme nonattainment under the National AAQS (8-hour) and as nonattainment under the California AAQS (1-hour and 8-hour). (CARB 2021b).

Lead (Pb) is a metal found naturally in the environment as well as in manufactured products. Once taken into the body, lead distributes throughout the body in the blood and accumulates in the bones. Depending on the level of exposure, lead can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems, and the cardiovascular system. Lead exposure also affects the oxygen-carrying capacity of the blood. The effects of lead most commonly encountered in current populations are neurological effects in children and cardiovascular effects in adults (e.g., high blood pressure and heart disease). Infants and young children are especially sensitive to even low levels of lead, which may contribute to behavioral problems, learning deficits, and lowered IQ (South Coast AQMD 2005; USEPA 2021). The major sources of lead emissions have historically been mobile and industrial sources. As a result of the EPA's regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector dramatically declined by 95 percent between 1980 and 1999, and levels of lead in the air decreased by 94 percent between 1980 and 1999. Today, the highest levels of lead in air are usually found near lead smelters. The major sources of lead emissions today are ore and metals processing and piston-engine aircraft operating on leaded aviation gasoline. However, in 2008 the EPA and CARB adopted stricter lead standards, and special monitoring sites immediately downwind of lead sources recorded very localized violations of the new state and federal standards.[5] As a result of these violations, the Los Angeles County portion of the SoCAB is designated nonattainment under the National AAQS for lead (South Coast AQMD 2012; CARB 2021b). Because emissions of lead are found only in projects that are permitted by South Coast AQMD, lead is not a pollutant of concern for the project.

TOXIC AIR CONTAMINANTS

The public's exposure to air pollutants classified as toxic air contaminants (TACs) is a significant environmental health issue in California. In 1983, the California Legislature enacted a program to identify the health effects of TACs and to reduce exposure to these contaminants to protect the public health. The California Health and Safety Code defines a TAC as "an air pollutant which may cause or contribute to an increase in mortality or in

2004 to 2007. The EPA approved the State of California's request to redesignate the South Coast PM_{10} nonattainment area to attainment of the PM_{10} National AAQS, effective on July 26, 2013.

[5] Source-oriented monitors record concentrations of lead at lead-related industrial facilities in the SoCAB, which include Exide Technologies in the City of Commerce; Quemetco, Inc., in the City of Industry; Trojan Battery Company in Santa Fe Springs; and Exide Technologies in Vernon. Monitoring conducted between 2004 through 2007 showed that the Trojan Battery Company and Exide Technologies exceed the federal standards (South Coast AQMD 2012).

serious illness, or which may pose a present or potential hazard to human health." A substance that is listed as a hazardous air pollutant (HAP) pursuant to Section 112(b) of the federal Clean Air Act (42 United States Code §7412[b]) is a toxic air contaminant. Under state law, the California Environmental Protection Agency (Cal/EPA), acting through CARB, is authorized to identify a substance as a TAC if it determines that the substance is an air pollutant that may cause or contribute to an increase in mortality or to an increase in serious illness, or may pose a present or potential hazard to human health.

California regulates TACs primarily through Assembly Bill (AB) 1807 (Tanner Air Toxics Act) and AB 2588 (Air Toxics "Hot Spot" Information and Assessment Act of 1987). The Tanner Air Toxics Act sets forth a formal procedure for CARB to designate substances as TACs. Once a TAC is identified, CARB adopts an "airborne toxics control measure" for sources that emit designated TACs. If there is a safe threshold for a substance (i.e., a point below which there is no toxic effect), the control measure must reduce exposure to below that threshold. If there is no safe threshold, the measure must incorporate toxics best available control technology to minimize emissions. To date, CARB has established formal control measures for 11 TACs, all of which are identified as having no safe threshold.

Air toxics from stationary sources are also regulated in California under the Air Toxics "Hot Spot" Information and Assessment Act of 1987. Under AB 2588, toxic air contaminant emissions from individual facilities are quantified and prioritized by the air quality management district or air pollution control district. High priority facilities are required to perform a health risk assessment and, if specific thresholds are exceeded, are required to communicate the results to the public in the form of notices and public meetings.

By the last update to the TAC list in December 1999, CARB had designated 244 compounds as TACs (CARB 1999). Additionally, CARB has implemented control measures for a number of compounds that pose high risks and show potential for effective control. The majority of the estimated health risks from TACs can be attributed to relatively few compounds, the most important being particulate matter from diesel-fueled engines.

Diesel Particulate Matter

In 1998, CARB identified particulate emissions from diesel-fueled engines (diesel PM) as a TAC. Previously, the individual chemical compounds in diesel exhaust were considered TACs. Almost all diesel exhaust particle mass is 10 microns or less in diameter. Because of their extremely small size, these particles can be inhaled and eventually trapped in the bronchial and alveolar regions of the lung.

CARB has promulgated the following specific rules to limit TAC emissions:

- 13 CCR Chapter 10, Section 2485, Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling
- 13 CCR Chapter 10, Section 2480, Airborne Toxic Control Measure to Limit School Bus Idling and Idling at Schools
- 13 CCR Section 2477 and Article 8, Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets and Facilities Where TRUs Operate

Community Risk

In addition, to reduce exposure to TACs, CARB developed and approved the *Air Quality and Land Use Handbook: A Community Health Perspective* (2005) to provide guidance regarding the siting of sensitive land uses in the vicinity of freeways, distribution centers, rail yards, ports, refineries, chrome-plating facilities, dry cleaners, and gasoline-dispensing facilities. This guidance document was developed to assess compatibility and associated health risks when placing sensitive receptors near existing pollution sources. CARB's recommendations on the siting of new sensitive land uses were based on a compilation of recent studies that evaluated data on the adverse health effects from proximity to air pollution sources. The key observation in these studies is that proximity to air pollution sources substantially increases exposure and the potential for adverse health effects. There are three carcinogenic toxic air contaminants that constitute the majority of the known health risks from motor vehicle traffic, DPM from trucks, and benzene and 1,3-butadiene from passenger vehicles. CARB recommendations are based on data that show that localized air pollution exposures can be reduced by as much as 80 percent by following CARB minimum distance separations.

Multiple Airborne Toxics Exposure Study (MATES)

The Multiple Air Toxics Exposure Study (MATES) is a monitoring and evaluation study on ambient concentrations of TACs and estimated the potential health risks from air toxics in the SoCAB. In 2008, South Coast AQMD conducted its third update to the MATES study (MATES III). The results showed that the overall risk for excess cancer from a lifetime exposure to ambient levels of air toxics was about 1,200 in a million. The largest contributor to this risk was diesel exhaust, accounting for 84 percent of the cancer risk (South Coast AQMD 2008b).

South Coast AQMD recently released the fourth update (MATES IV). The results showed that the overall monitored risk for excess cancer from a lifetime exposure to ambient levels of air toxics decreased to approximately 418 in one million. Compared to the 2008 MATES III, monitored excess cancer risks decreased by approximately 65 percent. Approximately 90 percent of the risk is attributed to mobile sources while 10 percent is attributed to TACs from stationary sources, such as refineries, metal processing facilities, gas stations, and chrome plating facilities. The largest contributor to this risk was diesel exhaust, accounting for approximately 68 percent of the air toxics risk. Compared to MATES III, MATES IV found substantial improvement in air quality and associated decrease in air toxics exposure. As a result, the estimated basin-wide population-weighted risk decreased by approximately 57 percent compared to the analysis done for the MATES III time period (South Coast AQMD 2015a).

The Office of Environmental Health Hazard Assessment (OEHHA) updated the guidelines for estimating cancer risks on March 6, 2015. The new method utilizes higher estimates of cancer potency during early life exposures, which result in a higher calculation of risk. There are also differences in the assumptions on breathing rates and length of residential exposures. When combined together, South Coast AQMD estimates that risks for a given inhalation exposure level will be about 2.7 times higher using the proposed updated methods identified in MATES IV (e.g., 2.7 times higher than 418 in one million overall excess cancer risk) (South Coast AQMD 2015a).

Air Quality Management Planning

The South Coast AQMD is the agency responsible for preparing the air quality management plan (AQMP) for the SoCAB in coordination with the Southern California Association of Governments (SCAG). Since 1979, a number of AQMPs have been prepared.

2016 AQMP

On March 3, 2017, the South Coast AQMD adopted the 2016 AQMP as an update to the 2012 AQMP. The 2016 AQMP addresses strategies and measures to attain the following National AAQS:

- 2008 National 8-hour ozone standard by 2031,
- 2012 National annual $PM_{2.5}$ standard by 2025[6],
- 2006 National 24-hour $PM_{2.5}$ standard by 2019,
- 1997 National 8-hour ozone standard by 2023, and the
- 1979 National 1-hour ozone standard by year 2022.

It is projected that total NO_X emissions in the SoCAB would need to be reduced to 150 tons per day (tpd) by year 2023 and to 100 tpd in year 2031 to meet the 1997 and 2008 federal 8-hour ozone standards. The strategy to meet the 1997 federal 8-hour ozone standard would also lead to attaining the 1979 federal 1-hour ozone standard by year 2022 (South Coast AQMD 2017), which requires reducing NO_X emissions in the SoCAB to 250 tpd. This is approximately 45 percent additional reductions above existing regulations for the 2023 ozone standard and 55 percent additional reductions above existing regulations to meet the 2031 ozone standard.

Reducing NO_X emissions would also reduce $PM_{2.5}$ concentrations in the SoCAB. However, as the goal is to meet the 2012 federal annual $PM_{2.5}$ standard no later than year 2025, South Coast AQMD is seeking to reclassify the SoCAB from "moderate" to "serious" nonattainment under this federal standard. A "moderate" non-attainment would require meeting the 2012 federal standard by no later than 2021.

Overall, the 2016 AQMP is composed of stationary and mobile-source emission reductions from regulatory control measures, incentive-based programs, co-benefits from climate programs, mobile-source strategies, and reductions from federal sources such as aircrafts, locomotives, and ocean-going vessels. Strategies outlined in the 2016 AQMP would be implemented in collaboration between CARB and the EPA (South Coast AQMD 2017).

LEAD STATE IMPLEMENTATION PLAN

In 2008, EPA designated the Los Angeles County portion of the SoCAB nonattainment under the federal lead (Pb) classification due to the addition of source-specific monitoring under the new federal regulation. This designation was based on two source-specific monitors in Vernon and the City of Industry exceeding the new standard. The rest of the SoCAB, outside the Los Angeles County nonattainment area remains in attainment of the new standard. On May 24, 2012, CARB approved the SIP revision for the federal lead standard, which

[6] The 2016 AQMP requests a reclassification from moderate to serious non-attainment for the 2012 National $PM_{2.5}$ standard.

the EPA revised in 2008. Lead concentrations in this nonattainment area have been below the level of the federal standard since December 2011. The SIP revision was submitted to EPA for approval.

AREA DESIGNATIONS

The AQMP provides the framework for air quality basins to achieve attainment of the state and federal ambient air quality standards through the State Implementation Plan (SIP). Areas are classified as attainment or nonattainment areas for particular pollutants, depending on whether they meet ambient air quality standards. Severity classifications for ozone nonattainment range in magnitude from marginal, moderate, and serious to severe and extreme.

- **Unclassified:** a pollutant is designated unclassified if the data are incomplete and do not support a designation of attainment or nonattainment.
- **Attainment:** a pollutant is in attainment if the CAAQS for that pollutant was not violated at any site in the area during a three-year period.
- **Nonattainment:** a pollutant is in nonattainment if there was at least one violation of a state AAQS for that pollutant in the area.
- **Nonattainment/Transitional:** a subcategory of the nonattainment designation. An area is designated nonattainment/transitional to signify that the area is close to attaining the AAQS for that pollutant.

The attainment status for the SoCAB is shown in Table 2. The SoCAB is designated in attainment of the California AAQS for sulfates. The SoCAB is designated as nonattainment for lead (Los Angeles County only) under the National AAQS.

Table 2 Attainment Status of Criteria Pollutants in the South Coast Air Basin

Pollutant	State	Federal
Ozone – 1-hour	Nonattainment	No Federal Standard
Ozone – 8-hour	Nonattainment	Extreme Nonattainment
PM_{10}	Nonattainment	Attainment (Serious Maintenance)
$PM_{2.5}$	Nonattainment	Nonattainment[1]
CO	Attainment	Attainment
NO_2	Attainment	Attainment (Maintenance)
SO_2	Attainment	Attainment
Lead	Attainment	Nonattainment (Los Angeles County only)[2]
All others	Attainment/Unclassified	Attainment/Unclassified

Source: CARB 2021b.

[1] The South Coast AQMD is seeking to reclassify the SoCAB from "moderate" to "serious" nonattainment under federal $PM_{2.5}$ standard.

[2] In 2010, the Los Angeles portion of the SoCAB was designated nonattainment for lead under the new federal and existing state AAQS as a result of large industrial emitters. Remaining areas in the SoCAB are unclassified.

Existing Ambient Air Quality

Existing levels of ambient air quality and historical trends and projections in the vicinity of the project site are best documented by measurements taken by the South Coast AQMD. The project site is located within Source Receptor Area (SRA) 19 – Saddleback Valley. The air quality monitoring station closest to the project site is the Mission Viejo-Via Pera, which monitors O_3, PM_{10}, and $PM_{2.5}$. Data from PM_{10} are supplemented by the Anaheim-Pampas Lane Monitoring Station. The most current five years of data from these monitoring stations are included in Table 3, *Ambient Air Quality Monitoring Summary*. The data show regular violations of the state and federal O_3, rare violations of federal $PM_{2.5}$ standards, and rare violations of state PM_{10} standards in the last five years.

Table 3 Ambient Air Quality Monitoring Summary

Pollutant/Standard	Number of Days Threshold Were Exceeded and Maximum Levels during Such Violations				
	2016	2017	2018	2019	2020
Ozone (O_3)[1]					
State 1-Hour ≥ 0.09 ppm (days exceed threshold)	5	3	2	3	20
State & Federal 8-hour ≥ 0.070 ppm (days exceed threshold)	13	25	9	11	32
Max. 1-Hour Conc. (ppm)	0.122	0.103	0.121	0.106	0.171
Max. 8-Hour Conc. (ppm)	0.093	0.083	0.088	0.087	0.122
Nitrogen Dioxide (NO_2)					
State 1-Hour ≥ 0.18 ppm (days exceed threshold)	0	0	0	0	0
Federal 1-Hour ≥ 0.100 ppm (days exceed threshold)	0	0	0	0	0
Max. 1-Hour Conc. (ppb)	0.0643	0.0812	0.0660	0.0594	0.0709
Coarse Particulates (PM_{10})[1]					
State 24-Hour > 50 µg/m^3 (days exceed threshold)	1	1	1	0	2
Federal 24-Hour > 150 µg/m^3 (days exceed threshold)	0	0	0	0	0
Max. 24-Hour Conc. (µg/m^3)	59.0	58.2	55.6	45.1	56.2
Fine Particulates ($PM_{2.5}$)[1]					
Federal 24-Hour > 35 µg/m^3 (days exceed threshold)	0	0	1	0	2
Max. 24-Hour Conc. (µg/m^3)	24.7	19.5	38.9	20.8	44.8

Source: CARB 2021a.

1 Data obtained from the Mission Viejo-Via Pera station for O_3, PM_{10}, and $PM_{2.5}$

2 Data obtained from the Anaheim-Pampas Lane station for NO_x.

ppm: parts per million; parts per billion, µg/m^3: micrograms per cubic meter

Notes: * Data not available.

Sensitive Receptors

Some land uses are considered more sensitive to air pollution than others due to the types of population groups or activities involved. Sensitive population groups include children, the elderly, the acutely ill, and the chronically ill, especially those with cardio-respiratory diseases.

Residential areas are also considered to be sensitive receptors to air pollution because residents (including children and the elderly) tend to be at home for extended periods of time, resulting in sustained exposure to

any pollutants present. Schools are also considered sensitive receptors, as children are present for extended durations and engage in regular outdoor activities. Recreational land uses are considered moderately sensitive to air pollution. Although exposure periods are generally short, exercise places a high demand on respiratory functions, which can be impaired by air pollution. In addition, noticeable air pollution can detract from the enjoyment of recreation. Industrial and commercial areas are considered the least sensitive to air pollution. Exposure periods are relatively short and intermittent, as the majority of the workers tend to stay indoors most of the time. In addition, the working population is generally the healthiest segment of the public. The nearest sensitive and non-sensitive receptors to the proposed project site are the residences along Valley Oak Drive to the west, Verizon Wireless Corporate Office to the north, residences along Sonata Street to the south and the SCE Santiago Substation to the east.

Methodology

Projected construction-related air pollutant emissions are calculated using the California Emissions Estimator Model (CalEEMod), Version 2020.4. CalEEMod compiles an emissions inventory of construction (fugitive dust, off-gas emissions, on-road emissions, and off-road emissions), area sources, indirect emissions from energy use, mobile sources, indirect emissions from waste disposal (annual only), and indirect emissions from water/wastewater (annual only) use. The calculated emissions of the project are compared to thresholds of significance for individual projects using the South Coast AQMD's *CEQA Air Quality Analysis Guidance Handbook*.

Thresholds of Significance

The analysis of the proposed project's air quality impacts follows the guidance and methodologies recommended in South Coast AQMD's *CEQA Air Quality Handbook* and the significance thresholds on South Coast AQMD's website (South Coast AQMD 1993). CEQA allows the significance criteria established by the applicable air quality management or air pollution control district to be used to assess impacts of a project on air quality. South Coast AQMD has established thresholds of significance for regional air quality emissions for construction activities and project operation. In addition to the daily thresholds listed above, projects are also subject to the AAQS. These are addressed though an analysis of localized CO impacts and localized significance thresholds (LSTs).

REGIONAL SIGNIFICANCE THRESHOLDS

The South Coast AQMD has adopted regional construction and operational emissions thresholds to determine a project's cumulative impact on air quality in the SoCAB. Table 4, *South Coast AQMD Significance Thresholds*, lists South Coast AQMD's regional significance thresholds that are applicable for all projects uniformly regardless of size or scope. There is growing evidence that although ultrafine particulates contribute a very small portion of the overall atmospheric mass concentration, they represent a greater proportion of the health risk from PM. However, the EPA or CARB have not yet adopted AAQS to regulate ultrafine particulates; therefore, South Coast AQMD has not developed thresholds for them.

Table 4 South Coast AQMD Significance Thresholds

Air Pollutant	Construction Phase	Operational Phase
Reactive Organic Gases (ROGs)/ Volatile Organic Compounds (VOCs)	75 lbs/day	55 lbs/day
Nitrogen Oxides (NO_X)	100 lbs/day	55 lbs/day
Carbon Monoxide (CO)	550 lbs/day	550 lbs/day
Sulfur Oxides (SO_X)	150 lbs/day	150 lbs/day
Particulates (PM_{10})	150 lbs/day	150 lbs/day
Particulates ($PM_{2.5}$)	55 lbs/day	55 lbs/day

Source: South Coast AQMD 2019.

Projects that exceed the regional significance threshold contribute to the nonattainment designation of the SoCAB. The attainment designations are based on the AAQS, which are set at levels of exposure that are determined to not result in adverse health. Exposure to fine particulate pollution and ozone causes myriad health impacts, particularly to the respiratory and cardiovascular systems:

- Linked to increased cancer risk ($PM_{2.5}$, TACs)
- Aggravates respiratory disease (O_3, $PM_{2.5}$)
- Increases bronchitis (O_3, $PM_{2.5}$)
- Causes chest discomfort, throat irritation, and increased effort to take a deep breath (O_3)
- Reduces resistance to infections and increases fatigue (O_3)
- Reduces lung growth in children ($PM_{2.5}$)
- Contributes to heart disease and heart attacks ($PM_{2.5}$)
- Contributes to premature death (O_3, $PM_{2.5}$)
- Linked to lower birth weight in newborns ($PM_{2.5}$) (South Coast AQMD 2015b)

Exposure to fine particulates and ozone aggravates asthma attacks and can amplify other lung ailments such as emphysema and chronic obstructive pulmonary disease. Exposure to current levels of $PM_{2.5}$ is responsible for an estimated 4,300 cardiopulmonary-related deaths per year in the SoCAB. In addition, University of Southern California scientists responsible for a landmark children's health study found that lung growth improved as air pollution declined for children aged 11 to 15 in five communities in the SoCAB (South Coast AQMD 2015c).

Mass emissions in Table 4 are not correlated with concentrations of air pollutants but contribute to the cumulative air quality impacts in the SoCAB. Therefore, regional emissions from a single project do not single-handedly trigger a regional health impact. South Coast AQMD is the primary agency responsible for ensuring the health and welfare of sensitive individuals to elevated concentrations of air quality in the SoCAB. To achieve the health-based standards established by the EPA, South Coast AQMD prepares an AQMP that details regional programs to attain the AAQS.

CO HOTSPOTS

Areas of vehicle congestion have the potential to create pockets of CO called hot spots. These pockets have the potential to exceed the state one-hour standard of 20 ppm or the eight-hour standard of 9 ppm. Because

CO is produced in greatest quantities from vehicle combustion and does not readily disperse into the atmosphere, adherence to ambient air quality standards is typically demonstrated through an analysis of localized CO concentrations. Hot spots are typically produced at intersections, where traffic congestion is highest because vehicles queue for longer periods and are subject to reduced speeds. With the turnover of older vehicles, introduction of cleaner fuels, and implementation of control technology on industrial facilities, CO concentrations in the SoCAB and in the state have steadily declined.

In 2007, the SoCAB was designated in attainment for CO under both the California AAQS and National AAQS. The CO hotspot analysis conducted for attainment by South Coast AQMD did not predict a violation of CO standards at the busiest intersections in Los Angeles during the peak morning and afternoon periods.[7] As identified in the South Coast AQMD's 2003 AQMP and the 1992 Federal Attainment Plan for Carbon Monoxide (1992 CO Plan), peak carbon monoxide concentrations in the SoCAB in previous years, prior to redesignation, were a result of unusual meteorological and topographical conditions and not a result of congestion at a particular intersection. Under existing and future vehicle emission rates, a project would have to increase traffic volumes at a single intersection by more than 44,000 vehicles per hour—or 24,000 vehicles per hour where vertical and/or horizontal air does not mix—in order to generate a significant CO impact (BAAQMD 2017).

LOCALIZED SIGNIFICANCE THRESHOLDS

The South Coast AQMD developed LSTs for emissions of NO_2, CO, PM_{10}, and $PM_{2.5}$ generated at the project site (offsite mobile-source emissions are not included in the LST analysis). LSTs represent the maximum emissions at a project site that are not expected to cause or contribute to an exceedance of the most stringent federal or state AAQS and are shown in Table 5, *South Coast AQMD Localized Significance Thresholds*.

[7] The four intersections were: Long Beach Boulevard and Imperial Highway; Wilshire Boulevard and Veteran Avenue; Sunset Boulevard and Highland Avenue; and La Cienega Boulevard and Century Boulevard. The busiest intersection evaluated (Wilshire and Veteran) had a daily traffic volume of approximately 100,000 vehicles per day with LOS E in the morning peak hour and LOS F in the evening peak hour.

Table 5 South Coast AQMD Localized Significance Thresholds

Air Pollutant (Relevant AAQS)	Concentration
1-Hour CO Standard (CAAQS)	20 ppm
8-Hour CO Standard (CAAQS)	9.0 ppm
1-Hour NO_2 Standard (CAAQS)	0.18 ppm
Annual NO_2 Standard (CAAQS)	0.03 ppm
24-Hour PM_{10} Standard – Construction (South Coast AQMD)[1]	10.4 µg/m^3
24-Hour $PM_{2.5}$ Standard – Construction (South Coast AQMD)[1]	10.4 µg/m^3
24-Hour PM_{10} Standard – Operation (South Coast AQMD)[1]	2.5 µg/m^3
24-Hour $PM_{2.5}$ Standard – Operation (South Coast AQMD)[1]	2.5 µg/m^3

Source: South Coast AQMD 2019.
ppm – parts per million; µg/m^3 – micrograms per cubic meter
[1] Threshold is based on South Coast AQMD Rule 403. Since the SoCAB is in nonattainment for PM_{10} and $PM_{2.5}$, the threshold is established as an allowable change in concentration. Therefore, background concentration is irrelevant.

To assist lead agencies, South Coast AQMD developed screening-level LSTs to back-calculate the mass amount (lbs. per day) of emissions generated onsite that would trigger the levels shown in Table 5 for projects under 5-acres. These "screening-level" LSTs tables are the localized significance thresholds for all projects of five acres and less; however, it can be used as screening criteria for larger projects to determine whether or not dispersion modeling may be required to compare concentrations of air pollutants generated by the project to the localized concentrations shown in Table 5.

In accordance with South Coast AQMD's LST methodology, the screening-level construction LSTs are based on the acreage disturbed per day based on equipment use. The screening-level construction LSTs for the project site in SRA 19 are shown in Table 6, *South Coast AQMD Screening-Level Construction Localized Significance Thresholds,* for sensitive receptors within 150 feet (46 meters).

Table 6 South Coast AQMD Screening-Level Construction Localized Significance Thresholds

	Threshold (lbs/day)[1]			
Acreage Disturbed	Nitrogen Oxides (NO_X)	Carbon Monoxide (CO)	Coarse Particulates (PM_{10})	Fine Particulates ($PM_{2.5}$)
≤ 1 Acre Disturbed Per Day	93	810	9.80	3.83
4.0 Acre Disturbed Per Day	169	1,763	27.13	8.88
4.5 Acre Disturbed Per Day	180	1,907	29.92	9.68
5.0 Acre Disturbed Per Day	190	2,051	32.72	10.49

Source: South Coast AQMD 2008a and 2011.
[1] LSTs are based on receptors within 150 feet (46 meters) in SRA 19.

Because the project is not an industrial project that has the potential to emit substantial sources of stationary emissions, operational LSTs are not an air quality impact of concern associated with the project.

Health Risk

Whenever a project would require use of chemical compounds that have been identified in South Coast AQMD Rule 1401, placed on CARB's air toxics list pursuant to AB 1807, or placed on the EPA's National Emissions

Standards for Hazardous Air Pollutants, a health risk assessment is required by the South Coast AQMD. Table 7, *Toxic Air Contaminants Incremental Risk Thresholds*, lists the TAC incremental risk thresholds for operation of a project. The purpose of this environmental evaluation is to identify the significant effects of the proposed project on the environment. CEQA does not require CEQA-level environmental document to analyze the environmental effects of attracting development and people to an area (*California Building Industry Association v. Bay Area Air Quality Management District (2015) 62 Cal.4th 369 (Case No. S213478)*). However, the environmental document must analyze the impacts of environmental hazards on future users, when a proposed project exacerbates an existing environmental hazard or condition. Residential, commercial, and office uses do not use substantial quantities of TACs and typically do not exacerbate existing hazards, so these thresholds are typically applied to new industrial projects.

Table 7 South Coast AQMD Toxic Air Contaminants Incremental Risk Thresholds

Maximum Incremental Cancer Risk	≥ 10 in 1 million
Hazard Index (project increment)	≥ 1.0
Cancer Burden in areas ≥ 1 in 1 million	> 0.5 excess cancer cases

Source: South Coast AQMD 2019.

GREENHOUSE GAS EMISSIONS

Scientists have concluded that human activities are contributing to global climate change by adding large amounts of heat-trapping gases, known as GHG, to the atmosphere. Climate change is the variation of Earth's climate over time, whether due to natural variability or as a result of human activities. The primary source of these GHG is fossil fuel use. The Intergovernmental Panel on Climate Change (IPCC) has identified four major GHG—water vapor,[8] carbon (CO_2), methane (CH_4), and ozone (O_3)—that are the likely cause of an increase in global average temperatures observed within the 20th and 21st centuries. Other GHG identified by the IPCC that contribute to global warming to a lesser extent include nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons, perfluorocarbons, and chlorofluorocarbons (IPCC 2001).[9] The major GHG are briefly described below.

- **Carbon dioxide (CO_2)** enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and respiration, and also as a result of other chemical reactions (e.g. manufacture of cement). Carbon dioxide is removed from the atmosphere (sequestered) when it is absorbed by plants as part of the biological carbon cycle.

- **Methane (CH_4)** is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices and from the decay of organic waste in municipal landfills and water treatment facilities.

- **Nitrous oxide (N_2O)** is emitted during agricultural and industrial activities as well as during combustion of fossil fuels and solid waste.

- **Fluorinated gases** are synthetic, strong GHGs that are emitted from a variety of industrial processes. Fluorinated gases are sometimes used as substitutes for ozone-depleting substances. These gases are typically emitted in smaller quantities, but because they are potent GHGs, they are sometimes referred to as high global-warming-potential (GWP) gases.

    - *Chlorofluorocarbons (CFCs*) are GHGs covered under the 1987 Montreal Protocol and used for refrigeration, air conditioning, packaging, insulation, solvents, or aerosol propellants. Since they are not destroyed in the lower atmosphere (troposphere, stratosphere), CFCs drift into the upper atmosphere where, given suitable conditions, they break down ozone. These gases are also ozone-depleting gases

[8] Water vapor (H_2O) is the strongest GHG and the most variable in its phases (vapor, cloud droplets, ice crystals). However, water vapor is not considered a pollutant, but part of the feedback loop rather than a primary cause of change.

[9] Black carbon contributes to climate change both directly, by absorbing sunlight, and indirectly, by depositing on snow (making it melt faster) and by interacting with clouds and affecting cloud formation. Black carbon is the most strongly light-absorbing component of particulate matter (PM) emitted from burning fuels such as coal, diesel, and biomass. Reducing black carbon emissions globally can have immediate economic, climate, and public health benefits. California has been an international leader in reducing emissions of black carbon, with close to 95 percent control expected by 2020 due to existing programs that target reducing PM from diesel engines and burning activities (CARB 2017a). However, state and national GHG inventories do not yet include black carbon due to ongoing work resolving the precise global warming potential of black carbon. Guidance for CEQA documents does not yet include black carbon.

and are therefore being replaced by other compounds that are GHGs covered under the Kyoto Protocol.

- ***Perfluorocarbons (PFCs)*** are a group of human-made chemicals composed of carbon and fluorine only. These chemicals (predominantly perfluoromethane [CF_4] and perfluoroethane [C_2F_6]) were introduced as alternatives, along with HFCs, to the ozone-depleting substances. In addition, PFCs are emitted as by-products of industrial processes and are used in manufacturing. PFCs do not harm the stratospheric ozone layer, but they have a high global warming potential.

- ***Sulfur Hexafluoride (SF_6)*** is a colorless gas soluble in alcohol and ether, slightly soluble in water. SF_6 is a strong GHG used primarily in electrical transmission and distribution systems as an insulator.

- ***Hydrochlorofluorocarbons (HCFCs)*** contain hydrogen, fluorine, chlorine, and carbon atoms. Although ozone-depleting substances, they are less potent at destroying stratospheric ozone than CFCs. They have been introduced as temporary replacements for CFCs and are also GHGs.

- ***Hydrofluorocarbons (HFCs)*** contain only hydrogen, fluorine, and carbon atoms. They were introduced as alternatives to ozone-depleting substances to serve many industrial, commercial, and personal needs. HFCs are emitted as by-products of industrial processes and are also used in manufacturing. They do not significantly deplete the stratospheric ozone layer, but they are strong GHGs (IPCC 2001; USEPA 2020).

GHGs are dependent on the lifetime or persistence of the gas molecule in the atmosphere. Some GHGs have stronger greenhouse effects than others. These are referred to as high GWP gases. The GWP of GHG emissions are shown in Table 8, *GHG Emissions and Their Relative Global Warming Potential Compared to CO_2*. The GWP is used to convert GHGs to CO_2-equivalence (CO_2e) to show the relative potential that different GHGs have to retain infrared radiation in the atmosphere and contribute to the greenhouse effect. For example, under IPCC's Fourth Assessment Report (AR4) GWP values for CH_4, a project that generates 10 metric tons (MT) of CH_4 would be equivalent to 250 MT of CO_2 (IPCC 2007).

Table 8 GHG Emissions and Their Relative Global Warming Potential Compared to CO_2

GHGs	Second Assessment Report (SAR) Global Warming Potential Relative to CO_2[1]	Fourth Assessment Report (AR4) Global Warming Potential Relative to CO_2[1]	Fifth Assessment Report (AR5) Global Warming Potential Relative to CO_2[1]
Carbon Dioxide (CO_2)	1	1	1
Methane[2] (CH_4)	21	25	28
Nitrous Oxide (N_2O)	310	298	265

Source: IPCC 1995, 2007, 2013.

Notes:

1 The methane GWP includes direct effects and indirect effects due to the production of tropospheric ozone and stratospheric water vapor. The indirect effect due to the production of CO_2 is not included.

2 Based on 100-year time horizon of the GWP of the air pollutant compared to CO_2.

3 The GWP values in the IPCC's Fifth Assessment Report (2013) reflect new information on atmospheric lifetimes of GHGs and an improved calculation of the radiative forcing of CO_2. However, South Coast AQMD uses the AR4 GWP values to maintain consistency in statewide GHG emissions modeling. In addition, the 2017 Scoping Plan Update was based on the AR4 GWP values.

California's Greenhouse Gas Sources and Relative Contribution

In 2020, the statewide GHG emissions inventory was updated for 2000 to 2018 emissions using the GWPs in IPCC's AR4.[10] Based on these GWPs, California produced 425.3 $MMTCO_2e$ GHG emissions in 2018. California's transportation sector was the single largest generator of GHG emissions, producing 39.9 percent of the state's total emissions. Industrial sector emissions made up 21.0 percent, and electric power generation made up 14.8 percent of the state's emissions inventory. Other major sectors of GHG emissions include commercial and residential (9.7 percent), agriculture and forestry (7.7 percent) high GWP (4.8 percent), and recycling and waste (2.1 percent) (CARB 2020a).

Since the peak level in 2004, California statewide GHG emissions dropped below the 2020 GHG limit of 431 $MMCO_2e$ in 2016 and have remained below the 2020 GHG limit since then. In 2018, emissions from routine GHG emitting activities statewide were 6 $MMTCO_2e$ lower than the 2020 GHG limit. Per capita GHG emissions in California have dropped from a 2001 peak of 14.0 $MTCO_2e$ per person to 10.7 $MTCO_2e$ per person in 2018, a 24 percent decrease. Transportation emissions decreased in 2018 compared to the previous year, which is the first year over year decrease since 2013. Since 2008, California's electricity sector has followed an overall downward trend in emissions. In 2018, solar power generation has continued its rapid growth since 2013. Emissions from high-GWP gases increased 2.3 percent in 2018 (2000-2018 average year-over-year increase is 6.8 percent), continuing the increasing trend as they replace Ozone Depleting Substances (ODS) being phased out under the 1987 Montreal Protocol. Overall trends in the inventory also demonstrate that the carbon intensity of California's economy (the amount of carbon pollution per million dollars of gross domestic product (GDP)) is declining, representing a 43 percent decline since the 2001 peak, while the state's GDP has grown 59 percent during this period (CARB 2020a).

Regulatory Settings

REGULATION OF GHG EMISSIONS ON A NATIONAL LEVEL

The US Environmental Protection Agency (EPA) announced on December 7, 2009, that GHG emissions threaten the public health and welfare of the American people and that GHG emissions from on-road vehicles contribute to that threat. The EPA's final findings respond to the 2007 U.S. Supreme Court decision that GHG emissions fit within the Clean Air Act definition of air pollutants. The findings do not in and of themselves impose any emission reduction requirements but allow the EPA to finalize the GHG standards proposed in 2009 for new light-duty vehicles as part of the joint rulemaking with the Department of Transportation (USEPA 2009).

To regulate GHGs from passenger vehicles, EPA was required to issue an endangerment finding. The finding identifies emissions of six key GHGs—CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, and SF_6—that have been the subject of scrutiny and intense analysis for decades by scientists in the United States and around the world. The first three are applicable to the project's GHG emissions inventory because they constitute the

[10] Methodology for determining the statewide GHG inventory is not the same as the methodology used to determine statewide GHG emissions under Assembly Bill 32 (2006).

majority of GHG emissions and, per South Coast AQMD guidance, are the GHG emissions that should be evaluated as part of a project's GHG emissions inventory.

US Mandatory Report Rule for GHGs (2009)

In response to the endangerment finding, the EPA issued the Mandatory Reporting of GHG Rule that requires substantial emitters of GHG emissions (large stationary sources, etc.) to report GHG emissions data. Facilities that emit 25,000 MT or more of CO_2 per year are required to submit an annual report.

Update to Corporate Average Fuel Economy Standards (2017 to 2026)

The federal government issued new Corporate Average Fuel Economy (CAFE) standards in 2012 for model years 2017 to 2025, which required a fleet average of 54.5 miles per gallon in 2025. On March 30, 2020, the EPA finalized an updated CAFE and GHG emissions standards for passenger cars and light trucks and established new standards covering model years 2021 through 2026, known as the Safer Affordable Fuel Efficient (SAFE) Vehicles Final Rule for Model Years 2021 to 2026. However, in May 2020, California and 22 other states; the District of Columbia; the cities of Los Angeles, Denver, and New York; and the counties of San Francisco and Denver filed a lawsuit with the U.S. Court of Appeals for the District of Columbia Circuit, challenging the SAFE Rule. To date, a ruling has not been made on the lawsuit. In addition, a consortium of automakers and California have agreed on a voluntary framework to reduce emissions that can serve as an alternative path forward for clean vehicle standards nationwide. Automakers who agreed to the framework are Ford, Honda, BMW of North America, and Volkswagen Group of America. The framework supports continued annual reductions of vehicle GHG emissions through the 2026 model year, encourages innovation to accelerate the transition to electric vehicles, and gives industry the certainty needed to make investments and create jobs. This commitment means that the auto companies which are party to the voluntary agreement will only sell cars in the United States that meet these standards (CARB 2020b). Additionally, the Biden Administration issued an Executive Order on January 21, 2021 to review and suspend the SAFE rule and for the USEPA to present a proposal for more stringent fuel economy and emissions standards by July 2021. On August 5, 2021, the Biden Administration proposed new standards that would replace the SAFE Rule, effectively reversing the previous Trump Administration's roll-back of the CAFE standards.

EPA Regulation of Stationary Sources under the Clean Air Act (Ongoing)

Pursuant to its authority under the Clean Air Act, the EPA has been developing regulations for new, large, stationary sources of emissions, such as power plants and refineries. Under former President Obama's 2013 Climate Action Plan, the EPA was directed to develop regulations for existing stationary sources as well. On June 19, 2019, the EPA issued the final Affordable Clean Energy (ACE) rule which became effective on August 19, 2019. The ACE rule was crafted under the direction of President Trump's Energy Independence Executive Order. It officially rescinds the Clean Power Plan rule issued during the Obama Administration and sets emissions guidelines for states in developing plans to limit CO_2 emissions from coal-fired power plants.

REGULATION OF GHG EMISSIONS ON A STATE LEVEL

Current State of California guidance and goals for reductions in GHG emissions are generally embodied in Executive Order S-3-05, Executive Order B-30-15, Executive Order B-55-18, Assembly Bill 32 (AB 32), Senate Bill 32 (SB 32) and Senate Bill 375 (SB 375).

Executive Order S-3-05

Executive Order S-3-05, signed June 1, 2005. Executive Order S-3-05 set the following GHG reduction targets for the State:

- 2000 levels by 2010
- 1990 levels by 2020
- 80 percent below 1990 levels by 2050

Assembly Bill 32, the Global Warming Solutions Act (2006)

AB 32 was passed by the California state legislature on August 31, 2006, to place the state on a course toward reducing its contribution of GHG emissions. AB 32 follows the 2020 tier of emissions reduction targets established in Executive Order S-03-05. CARB prepared the 2008 Scoping Plan to outline a plan to achieve the GHG emissions reduction targets of AB 32.

Executive Order B-30-15

Executive Order B-30-15, signed April 29, 2015, set a goal of reducing GHG emissions in the state to 40 percent of 1990 levels by year 2030. Executive Order B-30-15 also directed CARB to update the Scoping Plan to quantify the 2030 GHG reduction goal for the state and requires state agencies to implement measures to meet the interim 2030 goal as well as the long-term goal for 2050 in Executive Order S-03-05. It also requires the Natural Resources Agency to conduct triennial updates of the California adaption strategy, Safeguarding California, in order to ensure climate change is accounted for in state planning and investment decisions.

Senate Bill 32 and Assembly Bill 197

In September 2016, Governor Brown signed SB 32 and AB 197 into law, making the Executive Order goal for year 2030 into a statewide mandated legislative target. AB 197 established a joint legislative committee on climate change policies and requires the CARB to prioritize direction emissions reductions rather than the market-based cap-and-trade program for large stationary, mobile, and other sources.

2017 Climate Change Scoping Plan Update

Executive Order B-30-15 and SB 32 required CARB to prepare another update to the Scoping Plan to address the 2030 target for the state. On December 24, 2017, CARB adopted the 2017 Climate Change Scoping Plan Update, which outlined potential regulations and programs, including strategies consistent with AB 197 requirements, to achieve the 2030 target. The 2017 Scoping Plan established a new emissions limit of 260 $MMTCO_2e$ for the year 2030, which corresponds to a 40 percent decrease in 1990 levels by 2030 (CARB 2017c).

California's climate strategy will require contributions from all sectors of the economy, including enhanced focus on zero- and near-zero emission (ZE/NZE) vehicle technologies; continued investment in renewables, such as solar roofs, wind, and other types of distributed generation; greater use of low carbon fuels; integrated land conservation and development strategies; coordinated efforts to reduce emissions of short-lived climate pollutants (methane, black carbon, and fluorinated gases); and an increased focus on integrated land use planning, to support livable, transit-connected communities and conservation of agricultural and other lands. Requirements for GHG reductions at stationary sources complement local air pollution control efforts by the local air districts to tighten criteria air pollutants and TACs emissions limits on a broad spectrum of industrial sources. Major elements of the 2017 Scoping Plan framework include:

- Implementing and/or increasing the standards of the Mobile Source Strategy, which include increasing ZEV buses and trucks;
- Low Carbon Fuel Standard (LCFS), with an increased stringency (18 percent by 2030).
- Implementation of SB 350, which expands the Renewables Portfolio Standard (RPS) to 50 percent RPS and doubles energy efficiency savings by 2030.
- California Sustainable Freight Action Plan, which improves freight system efficiency, utilizes near-zero emissions technology, and deployment of ZEV trucks.
- Implementing the Short-Lived Climate Pollutant Strategy (SLPS), which focuses on reducing methane and hydrofluorocarbon emissions by 40 percent and anthropogenic black carbon emissions by 50 percent by year 2030.
- Post-2020 Cap-and-Trade Program that includes declining caps.
- Continued implementation of SB 375.
- Development of a Natural and Working Lands Action Plan to secure California's land base as a net carbon sink.

In addition to the statewide strategies listed above, the 2017 Climate Change Scoping Plan also identified local governments as essential partners in achieving the State's long-term GHG reduction goals and identified local actions to reduce GHG emissions. As part of the recommended actions, CARB recommends statewide targets of no more than 6 $MTCO_2e$ or less per capita by 2030 and 2 $MTCO_2e$ or less per capita by 2050. CARB recommends that local governments evaluate and adopt robust and quantitative locally-appropriate goals that align with the statewide per capita targets and the State's sustainable development objectives and develop plans to achieve the local goals. The statewide per capita goals were developed by applying the percent reductions necessary to reach the 2030 and 2050 climate goals (i.e., 40 percent and 80 percent, respectively) to the State's 1990 emissions limit established under AB 32. For CEQA projects, CARB states that lead agencies have discretion to develop evidenced-based numeric thresholds (mass emissions, per capita, or per service population)—consistent with the Scoping Plan and the state's long-term GHG goals. To the degree a project

relies on GHG mitigation measures, CARB recommends that lead agencies prioritize on-site design features that reduce emissions, especially from VMT, and direct investments in GHG reductions within the project's region that contribute potential air quality, health, and economic co-benefits. Where further project design or regional investments are infeasible or not proven to be effective, CARB recommends mitigating potential GHG impacts through purchasing and retiring carbon credits.

The 2017 Scoping Plan scenario is set against what is called the business-as-usual (BAU) yardstick—that is, what would the GHG emissions look like if the State did nothing at all beyond the existing policies that are required and already in place to achieve the 2020 limit, as shown in Table 9, *2017 Climate Change Scoping Plan Emissions Reductions Gap*. It includes the existing renewables requirements, advanced clean cars, the "10 percent" Low Carbon Fuel Standard (LCFS), and the SB 375 program for more vibrant communities, among others. However, it does not include a range of new policies or measures that have been developed or put into statute over the past two years. Also shown in the table, the known commitments are expected to result in emissions that are 60 $MMTCO_2e$ above the target in 2030. If the estimated GHG reductions from the known commitments are not realized due to delays in implementation or technology deployment, the post-2020 Cap-and-Trade Program would deliver the additional GHG reductions in the sectors it covers to ensure the 2030 target is achieved.

Table 9 2017 Climate Change Scoping Plan Emissions Reductions Gap

Modeling Scenario	2030 GHG Emissions $MMTCO_2e$
Reference Scenario (Business-as-Usual)	389
With Known Commitments	320
2030 GHG Target	**260**
Gap to 2030 Target	**60**

Source: CARB 2017c.

Table 10, *2017 Climate Change Scoping Plan Emissions Change by Sector*, provides estimated GHG emissions by sector, compared to 1990 levels, and the range of GHG emissions for each sector estimated for 2030.

Table 10 2017 Climate Change Scoping Plan Emissions Change by Sector

Scoping Plan Sector	1990 $MMTCO_2e$	2030 Proposed Plan Ranges $MMTCO_2e$	% Change from 1990
Agricultural	26	24-25	-8% to -4%
Residential and Commercial	44	38-40	-14% to -9%
Electric Power	108	30-53	-72% to -51%
High GWP	3	8-11	267% to 367%
Industrial	98	83-90	-15% to -8%
Recycling and Waste	7	8-9	14% to 29%
Transportation (including TCU)	152	103-111	-32% to -27%
Net Sink[1]	-7	TBD	TBD
Sub Total	431	294-339	-32% to -21%
Cap-and-Trade Program	NA	24-79	NA

Table 10 2017 Climate Change Scoping Plan Emissions Change by Sector

Scoping Plan Sector	1990 $MMTCO_2e$	2030 Proposed Plan Ranges $MMTCO_2e$	% Change from 1990
Total	**431**	**260**	**-40%**

Source: CARB 2017c.
Notes: TCU = Transportation, Communications, and Utilities; TBD: To Be Determined.
[1] Work is underway through 2017 to estimate the range of potential sequestration benefits from the natural and working lands sector.

Executive Order B-55-18

Executive Order B-55-18, signed September 10, 2018, sets a goal "to achieve carbon neutrality as soon as possible, and no later than 2045, and achieve and maintain net negative emissions thereafter." Executive Order B-55-18 directs CARB to work with relevant state agencies to ensure future Scoping Plans identify and recommend measures to achieve the carbon neutrality goal. The goal of carbon neutrality by 2045 is in addition to other statewide goals, meaning not only should emissions be reduced to 80 percent below 1990 levels by 2050, but that, by no later than 2045, the remaining emissions be offset by equivalent net removals of CO_2e from the atmosphere, including through sequestration in forests, soils, and other natural landscapes. The Scoping Plan is currently being updated by CARB to address the GHG reduction goals of Executive Order B-55-18 (i.e., 2022 Scoping Plan Update).

Senate Bill 375

In 2008, SB 375, the Sustainable Communities and Climate Protection Act, was adopted to connect the GHG emissions reductions targets established in the 2008 Scoping Plan for the transportation sector to local land use decisions that affect travel behavior. Its intent is to reduce GHG emissions from light-duty trucks and automobiles (excludes emissions associated with goods movement) by aligning regional long-range transportation plans, investments, and housing allocations to local land use planning to reduce VMT and vehicle trips. Specifically, SB 375 required CARB to establish GHG emissions reduction targets for each of the 18 metropolitan planning organizations (MPO). The Southern California Association of Governments (SCAG) is the MPO for the Southern California region, which includes the counties of Los Angeles, Orange, San Bernardino, Riverside, Ventura, and Imperial.

Pursuant to the recommendations of the Regional Transportation Advisory Committee, CARB adopted per capita reduction targets for each of the MPOs rather than a total magnitude reduction target. SCAG's targets are an 8 percent per capita reduction from 2005 GHG emission levels by 2020 and a 13 percent per capita reduction from 2005 GHG emission levels by 2035 (CARB 2010). The 2020 targets are smaller than the 2035 targets because a significant portion of the built environment in 2020 is defined by decisions that have already been made. In general, the 2020 scenarios reflect that more time is needed for large land use and transportation infrastructure changes. Most of the reductions in the interim are anticipated to come from improving the efficiency of the region's transportation network. The targets would result in 3 $MMTCO_2e$ of reductions by 2020 and 15 $MMTCO_2e$ of reductions by 2035. Based on these reductions, the passenger vehicle target in CARB's Scoping Plan (for AB 32) would be met (CARB 2010).

2017 Update to the SB 375 Targets

CARB is required to update the targets for the MPOs every eight years. In June 2017, CARB released updated targets and technical methodology and recently released another update in February 2018. The updated targets consider the need to further reduce VMT, as identified in the 2017 Scoping Plan Update, while balancing the need for additional and more flexible revenue sources to incentivize positive planning and action toward sustainable communities. Like the 2010 targets, the updated SB 375 targets are in units of percent per capita reduction in GHG emissions from automobiles and light trucks compared to 2005. This excludes reductions anticipated from implementation of state technology and fuels strategies and any potential future state strategies such as statewide road user pricing. The proposed targets call for greater per capita GHG emission reductions from SB 375 than are currently in place, which for 2035, translates into proposed targets that either match or exceed the emission reduction levels in the MPOs' currently adopted sustainable communities strategies (SCS). As proposed, CARB staff's proposed targets would result in an additional reduction of over 8 MMTCO_2e in 2035 compared to the current targets. For the next round of SCS updates, CARB's updated targets for the SCAG region are an 8 percent per capita GHG reduction in 2020 from 2005 levels (unchanged from the 2010 target) and a 19 percent per capita GHG reduction in 2035 from 2005 levels (compared to the 2010 target of 13 percent) (CARB 2018). CARB adopted the updated targets and methodology on March 22, 2018. All SCSs adopted after October 1, 2018, are subject to these new targets.

SCAG's Regional Transportation Plan / Sustainable Communities Strategy

SB 375 requires each MPO to prepare a sustainable communities strategy in its regional transportation plan. For the SCAG region, the draft 2020-2045 RTP/SCS (Connect SoCal) was adopted on May 7, 2020, for the limited purpose of transportation conformity (SCAG 2020). The Connect SoCal Plan was fully adopted in September 2020. In general, the SCS outlines a development pattern for the region that, when integrated with the transportation network and other transportation measures and policies, would reduce vehicle miles traveled from automobiles and light duty trucks and thereby reduce GHG emissions from these sources.

Connect SoCal focuses on the continued efforts of the previous RTP/SCSs to integrate transportation and land use strategies in development of the SCAG region through horizon year 2045 (SCAG 2020). Connect SoCal forecasts that the SCAG region will meet its GHG per capita reduction targets of 8 percent by 2020 and 19 percent by 2035. Additionally, Connect SoCal also forecasts that implementation of the plan will reduce VMT per capita in year 2045 by 4.1 percent compared to baseline conditions for that year. Connect SoCal includes a "Core Vision" that centers on maintaining and better managing the transportation network for moving people and goods while expanding mobility choices by locating housing, jobs, and transit closer together and increasing investments in transit and complete streets (SCAG 2020).

Transportation Sector Specific Regulations

Assembly Bill 1493

California vehicle GHG emission standards were enacted under AB 1493 (Pavley I). Pavley I is a clean-car standard that reduces GHG emissions from new passenger vehicles (light-duty auto to medium-duty vehicles) from 2009 through 2016 and is anticipated to reduce GHG emissions from new passenger vehicles by

30 percent in 2016. California implements the Pavley I standards through a waiver granted to California by the EPA. In 2012, the EPA issued a Final Rulemaking that sets even more stringent fuel economy and GHG emissions standards for model years 2017 through 2025 light-duty vehicles. (See also the discussion on the update to the Corporate Average Fuel Economy standards at the beginning of this Section 5.5.2 under "Federal.") In January 2012, CARB approved the Advanced Clean Cars program (formerly known as Pavley II) for model years 2017 through 2025. The program combines the control of smog, soot, and GHGs with requirements for greater numbers of ZE vehicles into a single package of standards. Under California's Advanced Clean Car program, by 2025 new automobiles will emit 34 percent less GHG emissions and 75 percent less smog-forming emissions.

Executive Order S-01-07

On January 18, 2007, the state set a new LCFS for transportation fuels sold in the state. Executive Order S-01-07 sets a declining standard for GHG emissions measured in CO_2e gram per unit of fuel energy sold in California. The LCFS required a reduction of 2.5 percent in the carbon intensity of California's transportation fuels by 2015 and a reduction of at least 10 percent by 2020. The standard applies to refiners, blenders, producers, and importers of transportation fuels, and uses market-based mechanisms to allow these providers to choose how they reduce emissions during the "fuel cycle" using the most economically feasible methods.

Executive Order B-16-2012

On March 23, 2012, the state identified that CARB, the California Energy Commission (CEC), the Public Utilities Commission, and other relevant agencies worked with the Plug-in Electric Vehicle Collaborative and the California Fuel Cell Partnership to establish benchmarks to accommodate ZE vehicles in major metropolitan areas, including infrastructure to support them (e.g., electric vehicle charging stations). The executive order also directed the number of ZE vehicles in California's state vehicle fleet to increase through the normal course of fleet replacement so that at least 10 percent of fleet purchases of light-duty vehicles are ZE by 2015 and at least 25 percent by 2020. The executive order also establishes a target for the transportation sector of reducing GHG emissions to 80 percent below 1990 levels.

Executive Order N-79-20

On September 23, 2020, Governor Newsom signed Executive Order N-79-20, whose goal is that 100 percent of in-state sales of new passenger cars and trucks will be ZE by 2035. Additionally, the fleet goals for trucks are that 100 percent of drayage trucks are ZE by 2035, and 100 percent of medium- and heavy-duty vehicles in the state are ZE by 2045, where feasible. The Executive Order's goal for the State is to transition to 100 percent ZE off-road vehicles and equipment by 2035, where feasible.

Renewables Portfolio: Carbon Neutrality Regulations

Senate Bills 1078, 107, and X1-2 and Executive Order S-14-08

A major component of California's Renewable Energy Program is the renewables portfolio standard established under Senate Bills 1078 (Sher) and 107 (Simitian). Under the RPS, certain retail sellers of electricity

were required to increase the amount of renewable energy each year by at least 1 percent in order to reach at least 20 percent by December 30, 2010. Executive Order S-14-08, signed in November 2008, expanded the state's renewable energy standard to 33 percent renewable power by 2020. This standard was adopted by the legislature in 2011 (SB X1-2). Renewable sources of electricity include wind, small hydropower, solar, geothermal, biomass, and biogas. The increase in renewable sources for electricity production will decrease indirect GHG emissions from development projects because electricity production from renewable sources is generally considered carbon neutral.

Senate Bill 350

Senate Bill 350 (de Leon) was signed into law September 2015 and establishes tiered increases to the RPS—40 percent by 2024, 45 percent by 2027, and 50 percent by 2030. SB 350 also set a new goal to double the energy-efficiency savings in electricity and natural gas through energy efficiency and conservation measures.

Senate Bill 100

On September 10, 2018, Governor Brown signed SB 100. Under SB 100, the RPS for public-owned facilities and retail sellers consist of 44 percent renewable energy by 2024, 52 percent by 2027, and 60 percent by 2030. SB 100 also established a new RPS requirement of 50 percent by 2026. Furthermore, the bill establishes an overall state policy that eligible renewable energy resources and zero-carbon resources supply 100 percent of all retail sales of electricity to California end-use customers and 100 percent of electricity procured to serve all state agencies by December 31, 2045. Under the bill, the state cannot increase carbon emissions elsewhere in the western grid or allow resource shuffling to achieve the 100 percent carbon-free electricity target.

Energy Efficiency Regulations

California Building Code: Building Energy Efficiency Standards

Energy conservation standards for new residential and nonresidential buildings were adopted by the California Energy Resources Conservation and Development Commission (now the CEC) in June 1977 and most recently revised in 2019 (Title 24, Part 6, of the California Code of Regulations [CCR]). Title 24 requires the design of building shells and building components to conserve energy. The standards are updated periodically to allow for consideration and possible incorporation of new energy efficiency technologies and methods.

The 2019 Building Energy Efficiency Standards, which were adopted on May 9, 2018, went into effect starting January 1, 2020. The 2019 standards move toward cutting energy use in new homes by more than 50 percent and require installation of solar photovoltaic systems for single-family homes and multifamily buildings of three stories and less. The 2019 standards focus on four key areas: 1) smart residential photovoltaic systems; 2) updated thermal envelope standards (preventing heat transfer from the interior to exterior and vice versa); 3) residential and nonresidential ventilation requirements; 4) and nonresidential lighting requirements (CEC 2018a). Under the 2019 standards, nonresidential buildings are 30 percent more energy efficient compared to the 2016 standards, and single-family homes are 7 percent more energy efficient (CEC 2018b). When accounting for the electricity generated by the solar photovoltaic system, single-family homes would use 53 percent less energy compared to homes built to the 2016 standards (CEC 2018b).

The CEC is currently amending the Building and Energy Efficiency Standards. The 2022 Building and Energy Efficiency Standards are anticipated to be adopted in December 2021 and will go into effect on January 1, 2023.

California Building Code: CALGreen

On July 17, 2008, the California Building Standards Commission adopted the nation's first green building standards. The California Green Building Standards Code (24 CCR, Part 11, known as "CALGreen") was adopted as part of the California Building Standards Code. CALGreen established planning and design standards for sustainable site development, energy efficiency (in excess of the California Energy Code requirements), water conservation, material conservation, and internal air contaminants.[11] The mandatory provisions of CALGreen became effective January 1, 2011, and were last updated in 2019. The 2019 CALGreen standards became effective January 1, 2020.

2006 Appliance Efficiency Regulations

The 2006 Appliance Efficiency Regulations (20 CCR §§ 1601–1608) were adopted by the CEC on October 11, 2006, and approved by the California Office of Administrative Law on December 14, 2006. The regulations include standards for both federally regulated appliances and non–federally regulated appliances. Though these regulations are now often viewed as "business as usual," they exceed the standards imposed by all other states, and they reduce GHG emissions by reducing energy demand.

Solid Waste Diversion Regulations

AB 939: Integrated Waste Management Act of 1989

California's Integrated Waste Management Act of 1989 (AB 939, Public Resources Code §§ 40050 et seq.) set a requirement for cities and counties throughout the state to divert 50 percent of all solid waste from landfills by January 1, 2000, through source reduction, recycling, and composting. In 2008, the requirements were modified to reflect a per capita requirement rather than tonnage. To help achieve this, the act requires that each city and county prepare and submit a source reduction and recycling element. AB 939 also established the goal for all California counties to provide at least 15 years of ongoing landfill capacity.

AB 341

AB 341 (Chapter 476, Statutes of 2011) increased the statewide goal for waste diversion to 75 percent by 2020 and requires recycling of waste from commercial and multifamily residential land uses. Section 5.408 of CALGreen also requires that at least 65 percent of the nonhazardous construction and demolition waste from nonresidential construction operations be recycled and/or salvaged for reuse.

AB 1327

The California Solid Waste Reuse and Recycling Access Act (AB 1327, Public Resources Code §§ 42900 et seq.) requires areas to be set aside for collecting and loading recyclable materials in development projects. The act required the California Integrated Waste Management Board to develop a model ordinance for adoption by any

[11] The green building standards became mandatory in the 2010 edition of the code.

local agency requiring adequate areas for collection and loading of recyclable materials as part of development projects. Local agencies are required to adopt the model or an ordinance of their own.

AB 1826

In October of 2014, Governor Brown signed AB 1826 requiring businesses to recycle their organic waste on and after April 1, 2016, depending on the amount of waste they generate per week. This law also requires that on and after January 1, 2016, local jurisdictions across the state implement an organic waste recycling program to divert organic waste generated by businesses and multifamily residential dwellings with five or more units. Organic waste means food waste, green waste, landscape and pruning waste, nonhazardous wood waste, and food-soiled paper waste that is mixed with food waste.

Water Efficiency Regulations

SBX7-7

The 20x2020 Water Conservation Plan was issued by the Department of Water Resources (DWR) in 2010 pursuant to Senate Bill 7, which was adopted during the 7th Extraordinary Session of 2009–2010 and therefore dubbed "SBX7-7." SBX7-7 mandated urban water conservation and authorized the DWR to prepare a plan implementing urban water conservation requirements (20x2020 Water Conservation Plan). In addition, it required agricultural water providers to prepare agricultural water management plans, measure water deliveries to customers, and implement other efficiency measures. SBX7-7 required urban water providers to adopt a water conservation target of 20 percent reduction in urban per capita water use by 2020 compared to 2005 baseline use.

AB 1881: Water Conservation in Landscaping Act

The Water Conservation in Landscaping Act of 2006 (AB 1881) requires local agencies to adopt the updated DWR model ordinance or an equivalent. AB 1881 also requires the CEC to consult with the DWR to adopt, by regulation, performance standards and labeling requirements for landscape irrigation equipment, including irrigation controllers, moisture sensors, emission devices, and valves to reduce the wasteful, uneconomic, inefficient, or unnecessary consumption of energy or water.

Short-Lived Climate Pollutant Reduction Strategy

Senate Bill 1383

On September 19, 2016, the Governor signed SB 1383 to supplement the GHG reduction strategies in the Scoping Plan to consider short-lived climate pollutants, including black carbon and methane. Black carbon is the light-absorbing component of fine particulate matter produced during incomplete combustion of fuels. SB 1383 required the state board, no later than January 1, 2018, to approve and begin implementing a comprehensive strategy to reduce emissions of short-lived climate pollutants to achieve a reduction in methane by 40 percent, hydrofluorocarbon gases by 40 percent, and anthropogenic black carbon by 50 percent below 2013 levels by 2030. The bill also established targets for reducing organic waste in landfills. On March 14, 2017, CARB adopted the Short-Lived Climate Pollutant Reduction Strategy, which identifies the state's approach to reducing anthropogenic and biogenic sources of short-lived climate pollutants. Anthropogenic sources of black

carbon include on- and off-road transportation, residential wood burning, fuel combustion (charbroiling), and industrial processes. According to CARB, ambient levels of black carbon in California are 90 percent lower than in the early 1960s, despite the tripling of diesel fuel use (CARB 2017a). In-use on-road rules were expected to reduce black carbon emissions from on-road sources by 80 percent between 2000 and 2020.

Thresholds of Significance

The CEQA Guidelines recommend that a lead agency consider the following when assessing the significance of impacts from GHG emissions on the environment:

1. The extent to which the project may increase (or reduce) GHG emissions as compared to the existing environmental setting;

2. Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project;

3. The extent to which the project complies with regulations or requirements adopted to implement an adopted statewide, regional, or local plan for the reduction or mitigation of GHG emissions.[12]

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

To provide guidance to local lead agencies on determining significance for GHG emissions in their CEQA documents, South Coast AQMD has convened a GHG CEQA Significance Threshold Working Group (Working Group). Based on the last Working Group meeting (Meeting No. 15) held in September 2010, South Coast AQMD is proposing to adopt a tiered approach for evaluating GHG emissions for development projects where South Coast AQMD is not the lead agency (South Coast AQMD 2010):

- **Tier 1.** If a project is exempt from CEQA, project-level and cumulative GHG emissions are less than significant.

- **Tier 2.** If the project complies with a GHG emissions reduction plan or mitigation program that avoids or substantially reduces GHG emissions in the project's geographic area (i.e., city or county), project-level and cumulative GHG emissions are less than significant.

- **Tier 3.** If GHG emissions are less than the screening-level threshold, project-level and cumulative GHG emissions are less than significant.

  For projects that are not exempt or where no qualifying GHG reduction plans are directly applicable, South Coast AQMD requires an assessment of GHG emissions. South Coast AQMD is proposing a screening-level threshold of 3,000 $MTCO_2e$ annually for all land use types or the following land-use-specific

[12] The Governor's Office of Planning and Research recommendations include a requirement that such a plan must be adopted through a public review process and include specific requirements that reduce or mitigate the project's incremental contribution of GHG emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable, notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

thresholds: 1,400 $MTCO_2e$ for commercial projects, 3,500 $MTCO_2e$ for residential projects, or 3,000 $MTCO_2e$ for mixed-use projects. These bright-line thresholds are based on a review of the Governor's Office of Planning and Research database of CEQA projects. Based on their review of 711 CEQA projects, 90 percent of CEQA projects would exceed the bright-line thresholds identified above. Therefore, projects that do not exceed the bright-line threshold would have a nominal, and therefore, less than cumulatively considerable impact on GHG emissions:

- **Tier 4.** If emissions exceed the screening threshold, a more detailed review of the project's GHG emissions is warranted.

  The South Coast AQMD Working Group has identified an efficiency target for projects that exceed the screening threshold of 4.8 $MTCO_2e$ per year per service population ($MTCO_2e$/year/SP) for project-level analyses and 6.6 $MTCO_2e$/year/SP for plan level projects (e.g., program-level projects such as general plans) for the year 2020.[13] The per capita efficiency targets are based on the AB 32 GHG reduction target and 2020 GHG emissions inventory prepared for CARB's 2008 Scoping Plan.

The bright-line screening-level criterion of 3,000 $MTCO_2e$/yr is used as the significance threshold for this project. Therefore, if the project operation-phase emissions exceed the 3,000 $MTCO_2e$/yr threshold, GHG emissions would be considered potentially significant in the absence of mitigation measures.

[13] It should be noted that the Working Group also considered efficiency targets for 2035 for the first time in this Working Group meeting.

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Assumptions Worksheet

CalEEMod Inputs - Oak Creek Community Park Expansion & Improvement Plan, Construction

Name:	Oak Creek Community Park Expansion & Improvement Plan
Project Number:	COI-56.0
Project Location:	15616 Valley Oak Drive
County/Air Basin:	Orange
Climate Zone:	8
Land Use Setting:	Urban
Operational Year:	2023
Utility Company:	Southern California Edison
Air Basin:	South Coast Air Basin
Air District:	South Coast AQMD
SRA:	19 - Saddleback Valley

Proiect Site Acreage	19.26
Disturbed Site Acreage	11.42

Project Components	SQFT	Tons	Unit Amount
Demolition			
Aphalt demo		61	N/A
New Construction	***SQFT***	***ACRES***	**Unit Amount**
Recreational	372,427	8.55	N/A
Parking Lot	22,401	0.51	131
Pavement	38,586	0.89	N/A
Other Non-Asphalt Surfaces			
Total Hardscape	38,378	0.88	N/A
Total Landscaping	25,578	0.59	N/A
Other Non-asphalt Surfaces	63,956.00	1.47	N/A

CalEEMod Land Use Inputs

Land Use Type	Land Use Subtype	Unit Amount	Size Metric	Lot Acreage	Land Use Square Feet
Recreational	City Park	372	1000 sqft	8.55	372,427
Parking	Parking Lot	131	1000 sqft	0.51	22,401
Parking	Other Asphalt Surfaces	N/A	1000 sqft	0.89	38,586
Parking	Other Non-asphalt Surfaces	N/A	1000 sqft	1.47	63,956
				11.42	

Demolition

Component	Amount to be Demolished (Tons)[2]	Haul Truck Capacity (Tons)[1]	Haul Distance (miles)[1]	Total Trip Ends	Duration (days)	Trip Ends/Day
Aphalt demo	61	20	20	7	3	2
Total	61			7		

Notes:

[1] CalEEMod default information used.

[2] Asphalt demolition tonnage provided by the City.

Soil Haul

Construction Activities	Volume (CY)[1]	Haul Truck Capacity (cy)[2]	Haul Distance (miles)[2]	Total Trip Ends	Total Days	Trip Ends/Day
Site Preparation (Import)	80	16	20	10	5	2

Notes:

[1] Volume of soil import provided by City.

[2] CalEEMod default information used.

Architectural Coating

	Percent Painted
Percentage Interior Painted:	100%
Percentage Exterior Painted:	100%
	VOC grams/Liter
Interior Paint VOC content:	100.00
Exterior Paint VOC content:	100.00

Structures	Land Use Square Feet	CalEEMod Factor[1]	Total Paintable Surface Area	Paintable Interior Area	Paintable Exterior Area
Parking					
Parking Lot (Striping)	22,401	6%	1,344	-	1,344
					1,344

Notes:

[1] Architectural coatings for the parking lot is based on CalEEMod methodology applied to a surface parking lot (i.e., striping), in which 6% of surface area is painted.

Construction Mitigation

SCAQMD Rule 403

Replace Ground Cover	PM10:	5	% Reduction
Replace Ground Cover	PM2.5:	5	% Reduction
Water Exposed Area	Frequency:	2	per day
	PM10:	55	% Reduction
	PM25:	55	% Reduction
Unpaved Roads	Vehicle Speed:	15	mph
SCAQMD Rule 1186	Clean Paved Road	9	% PM Reduction

Southern California Edison Carbon Intensity Factors

CO_2:[1,2]	509.98	pounds per megawatt hour
CH_4:[3]	0.033	pound per megawatt hour
N_2O:[3]	0.004	pound per megawatt hour

Notes:

[1] Based on CO2e intensity factor of 512 pounds per megawatt hour; Southern California Edison. 2021. 2020 Sustainability Report. https://www.edison.com/home/sustainability/sustainability-report.html

[2] Based on Intergovernmental Panel on Climate Change Fourth Assessment Report global warming potentials for CH4 and N2O; Intergovernmental Panel on Climate Change (IPCC). 2007. Fourth Assessment Report: Climate Change 2007.

[3] CalEEMod default values.

Global Warming Potentials (GWP)

	AR4	AR5
CO_2	1	1
CH_4	25	28
N_2O	298	265

Based on Intergovernmental Panel on Climate Change Fourth Assessment Report global warming potentials for CH4 and N2O; Intergovernmental Panel on Climate Change (IPCC).

CalEEMod Inputs - Oak Creek Community Park Expansion & Improvement Plan, Existing Conditions (2021 and 2023)

Name:	Oak Creek Community Park Expansion & Improvement Plan
Project Number:	COI-56.0
Project Location:	15616 Valley Oak Drive
County/Air Basin:	Orange
Climate Zone:	8
Land Use Setting:	Urban
Operational Year:	2021 & 2023
Utility Company:	Southern California Edison
Air Basin:	South Coast Air Basin
Air District:	South Coast AQMD
SRA:	19 - Saddleback Valley

Proiect Site Acreage 10.35

CalEEMod Land Use Inputs

Land Use Type	Land Use Subtype	Unit Amount	Size Metric	Lot Acreage	Land Use Square Feet
Recreational	City Park	6.34	Acres	6.34	276,083
Recreational (City Park Building)[1]	Raquet Club	2.60	1000 sqft	0.06	2,602
Total Recreational		**8.94**		**6.40**	**278,685.00**
Parking	Parking lot	1.32	Acres	1.32	57,595
Parking	Other asphalt surfaces	0.60	Acres	0.60	26,159
Parking	Other non-asphalt surfaces	2.03	Acres	2.03	88,407
				10.35	

Notes:

[1] Accounts for two remaining City Park buildings on-site

Trips - Provided by Urban Crossroads

Source: Urban Crossroads. 2021, June 8. Oak Creek Park Access and Circulation Considerations.

Land Use Type	Average Daily Trips	CalEEMod Trip Rate	Saturday Trips[1]	CalEEMod Trip Rate	Sunday Trips[1]	CalEEMod Trip Rate
Recreational[1]	397	**62.64**	794	**125.28**	794	**125.28**

Notes:

[1] Total trips assumed to be with City Park land use.

Trips	Annual Vehicle Miles Traveled[2]	Average Daily VMT[3]
Total Trips	**2,011,195**	**5,525**

Notes:

[1] Weekday trips and trip generation provided by Urban Crossroads. Assumes double the trip generation on Saturdays and Sundays compared to weekday (Urban Crossroad 2021).

[2] CalEEMod Default Annual VMT

[3] Daily VMT is calculated based on annual weekday VMT / 364 days per year.

	Trip Type Percentages		
	Primary	**Diverted**	**Passby**
Recreational	66%	28%	6%
Adjusted Trip Type Percentages	**100%**	**0%**	**0%**

Water Use[1,3]

Land Use	Outdoor[2]
Total Water Use (acre-feet/year)	29.03
Total Water Use (gal/year)	9,459,454.53

Notes:

[1] Potable and recycled water to the project site is provided by Irvine Ranch Water District, which provides tertiary treated wastewater in Irvine. Assume 100% aerobic treatment.

[2] Annual recycled outdoor water use was estimated over the past 12 months.

[3] Calculation excludes indoor water use since City Park Buildings will not be modified.

Solid Waste[1]

Land Use	(tons/year)
Recreational	0.93

Notes:

[1] California Air Pollution Control Officers Association (CAPCOA). 2017, October. California Emissions Estimator Model (CalEEMod) Appendix D, Default Data Tables.

Architectural Coating	Raquet Club
Percent Interior Painted (%):	100%
Percent Exterior Painted (%):	100%
Interior Paint VOC content (grams/liter):	100
Exterior Paint VOC content (grams/liter):	100

Structures	Land Use Square Feet	CalEEMod Factor[2]	Total Paintable Surface Area	Paintable Interior Area[1]	Paintable Exterior Area[1]
Non-Residential Structures					
Raquet Club[3]	2,602	2.0	5,204	3,903	1,301
				3,903	**1,301**
Parking					
Parking Lot	57,595	6%	3,456	-	3,456
					3,456

Notes:

[1] CalEEMod methodology calculates the paintable interior and exterior areas by multiplying the total paintable surface area by 75 and 25 percent, respectively.

[2] The program assumes the total surface for painting equals 2.7 times the floor square. footage for residential and 2.0 times that for nonresidential square footage defined by the user. Architectural coatings for the parking lot is based on CalEEMod methodology applied to a surface parking lot (i.e., striping), in which 6% of surface area is painted.

[3] Accounts for two remaining City Park Buildings onsite.

Electricity (Buildings)

Existing Energy

Modeling is conservative because the net increase in energy use due to the project is likely smaller than reflected due to improved building energy efficiency between the project and existing land uses.

Default CalEEMod Energy Use

Land Use Subtype	Title-24 Electricity Energy Intensity (kWhr/size/year)*	Nontitle-24 Electricity Energy Intensity (kWhr/size/year)	Lighting Energy Intensity (KWhr/size/year)	Title-24 Natural Gas Energy Intensity (KBTU/size/year)*	Nontitle-24 Natural Gas Energy Intensity (KBTU/size/year)
Recreational	**0.00**	0.00	0.00	**0.00**	0.00
Other Asphalt Surfaces	**0.00**	0.00	0.00	**0.00**	0.00
Other Non-Asphalt Surfaces	**0.00**	0.00	0.00	**0.00**	0.00
Parking Lot	**0.00**	0.00	0.35	**0.00**	0.00
Raquet Club	**1.45**	3.83	2.99	**13.90**	6.86

Notes:

[1] Raquet Club reprepsents the existing City Park Buildings onsite.

Southern California Edison Carbon Intensity Factors

CO_2:[1,2]	509.98	pounds per megawatt hour
CH_4:[3]	0.033	pound per megawatt hour
N_2O:[3]	0.004	pound per megawatt hour

Notes:

[1] Based on CO2e intensity factor of 512 pounds per megawatt hour; Southern California Edison. 2021. 2020 Sustainability Report. https://www.edison.com/home/sustainability/sustainability-report.html

[2] Based on Intergovernmental Panel on Climate Change Fourth Assessment Report global warming potentials for CH4 and N2O; Intergovernmental Panel on Climate Change (IPCC). 2007. Fourth Assessment Report: Climate Change 2007.

[3] CalEEMod default values.

Global Warming Potentials (GWP)		
	AR4	**AR5**
CO_2	1	1
CH_4	25	28
N_2O	298	265

Based on Intergovernmental Panel on Climate Change Fourth Assessment Report global warming potentials for CH4 and N2O; Intergovernmental Panel on Climate Change (IPCC).

Field Lighting

Electricity:				
	Total Average kW/Day [1]	**Days/Year[2]**	**Hours[2]**	**Kwh (Annual)**
Existing Soccer Field	25.74	365	3	28,185

Notes:

[1] Based on Musco Lighting Plan for the proposed sports complex as provided by the City.

[2] Assumes lights will be on 365 days per year for 3 hours per day on average

Calculation of GHGs from Field Lighting				
CO_2	**CH_4**	**N_2O**	**CO_2e**	**CO_2e**
lbs/Mwh	**lbs/Mwh**	**lbs/Mwh**	**lbs/Mwh**	**MT/Kwh**
509.98000	0.03300	0.00400	512.00	0.000232
				MT/Year
			CO_2e from Lighting	**6.55**

CalEEMod Inputs - Oak Creek Community Park Expansion & Improvement Plan, Project Operations

Name:	Oak Creek Community Park Expansion & Improvement Plan
Project Number:	COI-56.0
Project Location:	15616 Valley Oak Drive
County/Air Basin:	Orange
Climate Zone:	8
Land Use Setting:	Urban
Operational Year:	2023
Utility Company:	Southern California Edison
Air Basin:	South Coast Air Basin
Air District:	South Coast AQMD
SRA:	19 - Saddleback Valley

Proiect Site Acreage 19.26

Project Components (proposed)	SQFT	Tons
Recreational	372,427	8.55
Parking Lot	22,401	0.51
Pavement	38,586	0.89
Total Hardscape	38,378	0.88
Total Landscaping	25,578	0.59
Other Non-asphalt Surfaces	**63,956**	**1.47**

CalEEMod Land Use Inputs

Land Use Type	Land Use Subtype	Unit Amount	Size Metric	Lot Acreage	Land Use Square Feet
Recreational	City Park	15.01	Acres	15.01	653,826
Recreational	Raquet Club	2.60	1000 sqft	0.06	2,602
Total Recreational		**17.61**		**15.07**	**656,428**
Parking	Parking Lot	80.00	1000 sqft	1.84	79,996
Parking (pavement)	Other Asphalt Surfaces	38.59	1000 sqft	0.89	38,586
Parking	Other Non-asphalt Surfaces	63.96	1000 sqft	1.47	63,956
				19.26	

Trips - Provided by Urban Crossroads

Source: Urban Crossroads. 2021, June 8. Oak Creek Park Access and Circulation Considerations.

Land Use Type	Average Daily Trips	CalEEMod Trip Rate	Saturday Trips	CalEEMod Trip Rate	Sunday Trips	CalEEMod Trip Rate
Recreational	714	**47.57**	1,428	**95.14**	1,428	**95.14**

Notes:

[1] Total trips assumed to be with City Park land use.

Trips	Annual Vehicle Miles Traveled[2]	VMT[3]
Total Trips	**3,615,989**	**9,934**

Notes:

[1] Weekday trips and trip generation provided by Urban Crossroads. Assumes double the trip generation on Saturdays and Sundays compared to weekday (Urban Crossroad 2021).

[2] CalEEMod Default Annual VMT.

[3] Daily VMT is calculated based on annual weekday VMT / 364 days per year.

	Trip Type Percentages		
	Primary	**Diverted**	**Passby**
Recreational	66%	28%	6%
Adjusted Trip Type Percentages	**100%**	**0%**	**0%**

Water Use[1,4]

Land Use	Outdoor[2]	Net Change
Total Water Use (acre-feet/year)	46.48	17.45
Total Water Use (gal/year)	15,145,554	5,686,100

Notes:

[1] Potable and recycled water to the project site is provided by Irvine Ranch Water District, which provides tertiary treated wastewater in Irvine. Assume 100% aerobic treatment.

[2] Outdoor water use is based on the California Department of Water Resources' Water Budget Workbook for New and Rehabilitated Non-Residential Landscapes. This is a highly conservative number and is expected to be less than this amount.

[3] Proposed project would not require wastewater services since the only water demand would be for outdoor water uses only.

[4] Calculation excludes indoor water use since restrooms will not be modified.

Solid Waste[1]

Land Use	(tons/year)
Recreational	1.73

Notes:

[1] California Air Pollution Control Officers Association (CAPCOA). 2017, October. California Emissions Estimator Model (CalEEMod) Appendix D, Default Data Tables.

Architectural Coating	Raquet C lub
Percent Interior Painted (%):	100%
Percent Exterior Painted (%):	100%
Interior Paint VOC content (grams/liter):	100
Exterior Paint VOC content (grams/liter):	100

Structures	Land Use Square Feet	CalEEMod Factor[2]	Total Paintable Surface Area	Paintable Interior Area[1]	Paintable Exterior Area[1]
Non-Residential Structures					
Raquet Club[3]	2,602	2.0	5,204	3,903	1,301
				3,903	**1,301**
Parking					
Parking Lot	79,996	6%	4,800	-	4,800
					4,800

Notes:

[1] CalEEMod methodology calculates the paintable interior and exterior areas by multiplying the total paintable surface area by 75 and 25 percent, respectively.

[2] The program assumes the total surface for painting equals 2.7 times the floor square. footage for residential and 2.0 times that for nonresidential square footage defined by the user. Architectural coatings for the parking lot is based on CalEEMod methodology applied to a surface parking lot (i.e., striping), in which 6% of surface area is painted.

[3] Accounts for two remaining City Park Buildings onsite.

Electricity (Buildings)

Existing Energy

Modeling is conservative because the net increase in energy use due to the project is likely smaller than reflected due to improved building energy efficiency between the project and existing land uses.

Default CalEEMod Energy Use

Land Use Subtype	Title-24 Electricity Energy Intensity (kWhr/size/year)*	Nontitle-24 Electricity Energy Intensity (kWhr/size/year)	Lighting Energy Intensity (KWhr/size/year)	Title-24 Natural Gas Energy Intensity (KBTU/size/year)*	Nontitle-24 Natural Gas Energy Intensity (KBTU/size/year)
Recreational	**0.00**	0.00	0.00	**0.00**	0.00
Other Non-Asphalt Surfaces	**0.00**	0.00	0.00	**0.00**	0.00
Parking Lot	**0.00**	0.00	0.35	**0.00**	0.00
Raquet Club	**1.45**	3.83	2.99	**13.90**	6.86

Notes:

[1] Raquet Club reprepsents the existing City Park Buildings onsite.

Southern California Edison Carbon Intensity Factors

CO_2:[1,2]	509.98	pounds per megawatt hour
CH_4:[3]	0.033	pound per megawatt hour
N_2O:[3]	0.004	pound per megawatt hour

Notes:

[1] Based on CO2e intensity factor of 512 pounds per megawatt hour; Southern California Edison. 2021. 2020 Sustainability Report. https://www.edison.com/home/sustainability/sustainability-report.html

[2] Based on Intergovernmental Panel on Climate Change Fourth Assessment Report global warming potentials for CH4 and N2O; Intergovernmental Panel on Climate Change (IPCC). 2007. Fourth Assessment Report: Climate Change 2007.

[3] CalEEMod default values.

Global Warming Potentials (GWP)		
	AR4	**AR5**
CO_2	1	1
CH_4	25	28
N_2O	298	265

Based on Intergovernmental Panel on Climate Change Fourth Assessment Report global warming potentials for CH4 and N2O; Intergovernmental Panel on Climate Change (IPCC).

Field Lighting

Electricity:				
	Total Average kW/Day [1]	Days/Year[2]	Hours[2]	Kwh (Annual)
Dog Park (former Soccer Field)	25.74	365	3	28,185
Soccer Field 1	25.74	365	3	28,185
Soccer Field 2	28.60	365	3	31,317
Total	80.08			87,688

Notes:

[1] Based on Musco Lighting Plan for the proposed sports complex as provided by the City.

[2] Assumes lights will be on 365 days per year for 3 hours per day on average

Calculation of GHGs from Field Lighting				
CO_2	CH_4	N_2O	CO_2e	CO_2e
lbs/Mwh	lbs/Mwh	lbs/Mwh	lbs/Mwh	MT/Kwh
509.98000	0.03300	0.00400	512.00	0.000232

	MT/Year	Net Change
CO_2e from Lighting	20.36	13.82

Construction Activities and Schedule Assumptions: Oak Creek Community Park

based on durations provided by the City.

Construction Schedule

Construction Activities	Phase Type	Start Date	End Date	CalEEMod Duration (Workday)
Asphalt Demolition	Demolition	6/1/2022	7/1/2022	23
Asphalt Demolition Debris Haul	Demolition	6/29/2022	7/1/2022	3
Site Preparation	Site Preparation	6/1/2022	8/1/2022	44
Site Preparation Soil Haul	Site Preparation	7/26/2022	8/1/2022	5
Rough Grading	Grading	7/2/2022	8/1/2022	21
Utility Trenching	Trenching	7/2/2022	8/1/2022	21
Fine Grading	Grading	8/2/2022	9/1/2022	23
Asphalt Paving	Paving	9/1/2022	10/1/2022	22
Finishing/Landscaping	Trenching	8/2/2022	1/1/2023	109
Architectural Coating[1]	Architectural Coating	11/1/2022	11/7/2022	5

Notes:

[1] Duration is based on a quarter of the duration for the default CalEEMod Paving phase.

Overlapping Construction Schedule

1	Asphalt Demolition, Site Preparation	6/1/2022	6/28/2022	20
2	Asphalt Demolition and Debris Haul, Site Preparation	6/29/2022	7/1/2022	3
4	Site Preparation, Rough Grading, Utilities Trenching	7/2/2022	7/25/2022	16
5	Site Preparation and Soil Haul, Rough Grading, Utilities Trenching	7/26/2022	8/1/2022	5
7	Fine Grading and Finishing/Landscaping	8/2/2022	8/31/2022	22
8	Fine Grading, Paving, and Finishing/Landscaping	9/1/2022	9/1/2022	1
9	Asphalt Paving and Finishing/Landscaping	9/2/2022	10/1/2022	21
	Finishing/Landscaping 2022	10/2/2022	10/31/2022	21
	Finishing/Landscaping and Architectural Coating	11/1/2022	11/7/2022	5
	Finishing/Landscaping 2023	11/8/2022	1/1/2023	39

CalEEMod Construction Off-Road Equipment Inputs

**Based on equipment mix provided by the applicant.*

General Construction Hours: 8 hours btwn 7:00 AM to 4:00 PM (with 1 hr break), Mon-Fri

Construction Equipment Details						
Equipment	**model**	**# of Equipment**	**hr/day**	**hp**	**load factor***	**total trips/Day**
Asphalt Demolition						
Concrete/Industrial Saws		1	8	81	0.73	
Excavators		3	8	158	0.38	
Rubber tired dozers		2	8	247	0.4	
Worker Trips						15
Vendor Trips						
Hauling Trips (TOTAL TRIPS)						
Water Trucks						4
Asphalt Demolition Debris Haul						
Worker Trips						
Vendor Trips						
Hauling Trips (TOTAL TRIPS)						7
Water Trucks						
Site Preparation						
Rubber tired dozers		3	8	247	0.4	
Tractors/loaders/backhoes		4	8	97	0.37	
Worker Trips						18
Vendor Trips						
Hauling Trips (TOTAL TRIPS)						
Water Trucks						4
Site Preparation Soil Haul						
Worker Trips						
Vendor Trips						
Hauling Trips (TOTAL TRIPS)						10
Rough Grading						
Excavators		2	8	158	0.38	
Graders		1	8	187	0.41	
Rubber Tired Dozers		1	8	247	0.4	
Scrapers		2	8	367	0.48	
Tractors/Loaders/Backhoes		2	8	97	0.37	
Worker Trips						20
Vendor Trips						
Hauling Trips (TOTAL TRIPS)						
Water Trucks						4
Utility Trenching						
Excavators		1	8	158	0.3819	
Worker Trips						3
Vendor Trips						
Hauling Trips (TOTAL TRIPS)						
Fine Grading						
Excavators		2	8	158	0.38	
Graders		1	8	187	0.41	
Rubber Tired Dozers		1	8	247	0.4	
Scrapers		2	8	367	0.48	
Tractors/Loaders/Backhoes		2	8	97	0.37	
Worker Trips						20
Vendor Trips						
Hauling Trips (TOTAL TRIPS)						
Water Trucks						4
Asphalt Paving						
Pavers		2	8	130	0.42	
Paving equipment		2	8	132	0.36	
Rollers		2	8	80	0.38	
Worker Trips						15
Vendor Trips						
Hauling Trips (TOTAL TRIPS)						
Finishing/Landscaping						
Excavators		1	8	158	0.3819	
Worker Trips						209
Vendor Trips						81
Hauling Trips (TOTAL TRIPS)						

Architectural Coating

Air Compressors		1	6	78	0.48	
Worker Trips						42
Vendor Trips						
Hauling Trips (TOTAL TRIPS)						

** CalEEMod default equipment mix*

Construction Trips Worksheet

Phase Name	Worker Trip Ends Per Day	Vendor Trip Ends Per Day	Haul Truck Trip Ends Per Day	Total Haul Truck Trip Ends	Start Date	End Date	Workdays
Asphalt Demolition	15	0	0	0	6/1/2022	7/1/2022	23
Asphalt Demolition Debris Haul	0	0	3	7	6/29/2022	7/1/2022	3
Site Preparation	18	0	0	0	6/1/2022	8/1/2022	44
Site Preparation Soil Haul	0	0	2	10	7/26/2022	8/1/2022	5
Rough Grading	20	0	0	0	7/2/2022	8/1/2022	21
Utility Trenching	3	0	0	0	7/2/2022	8/1/2022	21
Fine Grading	20	0	0	0	8/2/2022	9/1/2022	23
Asphalt Paving	15	0	0	0	9/1/2022	10/1/2022	22
Finishing/Landscaping	209	81	0	0	8/2/2022	1/1/2023	109
Architectural Coating	42	0	0	0	11/1/2022	11/7/2022	5

Construction Activity (Overlapping)	Worker Trip Ends Per Day	Vendor Trip Ends Per Day	Haul Truck Trip Ends Per Day	Total Trip Ends Per Day	Start Date	End Date	Workdays
Asphalt Demolition, Site Preparation	33	0	0	0	6/1/2022	6/28/2022	20
Asphalt Demolition and Debris Haul, Site Preparation	33	0	3	7	6/29/2022	7/1/2022	3
Site Preparation, Rough Grading, Utilities Trenching	41	0	0	0	7/2/2022	7/25/2022	16
Site Preparation and Soil Haul, Rough Grading, Utilities Trenching	41	0	2	10	7/26/2022	8/1/2022	5
Fine Grading and Finishing/Landscaping	229	81	0	0	8/2/2022	8/31/2022	22
Fine Grading, Paving, and Finishing/Landscaping	244	81	0	0	9/1/2022	9/1/2022	1
Asphalt Paving and Finishing/Landscaping	224	81	0	0	9/2/2022	10/1/2022	21
Finishing/Landscaping 2022	209	81	0	0	10/2/2022	10/31/2022	21
Finishing/Landscaping and Architectural Coating	251	81	0	0	11/1/2022	11/7/2022	5
Finishing/Landscaping 2023	209	81	0	0	11/8/2022	1/1/2023	39
Maximum Daily Trips	**251**	**81**	**3**	**10**			

Changes to the CalEEMod Defaults - Fleet Mix 2023

Weekday Trips 714

Default	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH	
FleetMix (Model Default)	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942	100%
Trips	389	42	133	92	17	5	10	3	0	0	17	1	3	714
Percent	81%			13%	6%									100%
without buses/MH	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0	0	0.024332	0.000000	0.000000	99%
Percent	81%			13%	5%									99%
Adjusted without buses/MH	0.544795	0.058861	0.186903	0.129401	0.027163	0.007266	0.015867	0.005409	0.000000	0.000000	0.027109	0.000000	0.000000	
Percent adjusted	82%			13%	6%									100%
Assumed Mix	97.0%			2.00%	1.00%									100%
adjusted with Assumed	**0.646291**	**0.069827**	**0.221723**	**0.020000**	**0.004876**	**0.001304**	**0.002848**	**0.000971**	**0.000000**	**0.000000**	**0.032159**	**0.000000**	**0.000000**	**100%**
Percent Check:	97%			2%	1%									
Trips	461	50	158	14	3	1	2	1	0	0	23	0	0	714
	693			*14*	*7*									

Fleet mix for the project is modified to reflect a higher proportion of passenger vehicles that the regional VMT. Assumes a mix of approximately 97% passenger vehicles, 2% medium duty trucks, and 1% heavy duty trucks and buses.

Emissions Worksheet

Regional Operation Emissions Worksheet[1]

[1] CalEEMod, Version 2020.4

Existing Buildout (2023)

Summer

	ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Area	0.14	0.00	0.00	0.00	0.00	0.00
Energy	0.00	0.01	0.01	0.00	0.00	0.00
Mobile	2.74	1.75	27.70	0.05	6.56	1.76
Total	**2.88**	**1.76**	**27.71**	**0.05**	**6.56**	**1.76**

Winter

	ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Area	0.14	0.00	0.00	0.00	0.00	0.00
Energy	0.00	0.01	0.01	0.00	0.00	0.00
Mobile	2.73	1.91	27.34	0.05	6.56	1.76
Total	**2.87**	**1.93**	**27.35**	**0.05**	**6.56**	**1.76**

Max Daily

	ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Area	0.14	0.00	0.00	0.00	0.00	0.00
Energy	0.00	0.01	0.01	0.00	0.00	0.00
Mobile	2.74	1.91	27.70	0.05	6.56	1.76
Total	**2.88**	**1.93**	**27.71**	**0.05**	**6.56**	**1.76**

Proposed Project (2023)

Summer

	ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Area	0.16	0.00	0.02	0.00	0.00	0.00
Energy	0.00	0.01	0.01	0.00	0.00	0.00
Mobile	4.92	3.14	49.79	0.10	11.79	3.16
Total	**5.09**	**3.16**	**49.83**	**0.10**	**11.79**	**3.17**

Winter

	ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Area	0.16	0.00	0.02	0.00	0.00	0.00
Energy	0.00	0.01	0.01	0.00	0.00	0.00
Mobile	4.92	3.44	49.15	0.09	11.79	3.16
Total	**5.08**	**3.46**	**49.18**	**0.09**	**11.79**	**3.17**

Max Daily

	ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Area	0.16	0.00	0.02	0.00	0.00	0.00
Energy	0.00	0.01	0.01	0.00	0.00	0.00
Mobile	4.92	3.44	49.79	0.10	11.79	3.16
Total	**5.09**	**3.46**	**49.83**	**0.10**	**11.79**	**3.17**

Net Proposed Operations

Summer

	ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Area	0.03	0.00	0.02	0.00	0.00	0.00
Energy	0.00	0.00	0.00	0.00	0.00	0.00
Mobile	2.18	1.40	22.10	0.04	5.23	1.40
Total	**2.21**	**1.40**	**22.12**	**0.04**	**5.23**	**1.40**

Winter

	ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Area	0.03	0.00	0.02	0.00	0.00	0.00
Energy	0.00	0.00	0.00	0.00	0.00	0.00
Mobile	2.18	1.53	21.81	0.04	5.23	1.40
Total	**2.21**	**1.53**	**21.83**	**0.04**	**5.23**	**1.40**

Max Daily

	ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Area	0.03	0.00	0.02	0.00	0.00	0.00
Energy	0.00	0.00	0.00	0.00	0.00	0.00
Mobile	2.18	1.53	22.10	0.04	5.23	1.40
Total	**2.21**	**1.53**	**22.12**	**0.04**	**5.23**	**1.40**
Regional Thresholds (lb/day)	**55**	**55**	**550**	**150**	**150**	**55**
Exceeds Thresholds?	No	No	No	No	No	No

Regional Construction Emissions Worksheet:

Asphalt Demolition							
			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2022** Summer						
	Fugitive Dust						0.02	0.00
	Off-Road		2.64	25.72	20.59	0.04	1.24	1.16
	Total		**2.64**	**25.72**	**20.59**	**0.04**	**1.27**	**1.16**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.01	0.18	0.06	0.00	0.03	0.01
	Worker		0.05	0.03	0.49	0.00	0.16	0.04
	Total		**0.05**	**0.21**	**0.56**	**0.00**	**0.18**	**0.05**
TOTAL			***2.69***	***25.93***	***21.15***	***0.04***	***1.45***	***1.21***
Onsite		**2022** Winter						
	Fugitive Dust						0.02	0.00
	Off-Road		2.64	25.72	20.59	0.04	1.24	1.16
	Total		**2.64**	**25.72**	**20.59**	**0.04**	**1.27**	**1.16**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.01	0.19	0.07	0.00	0.03	0.01
	Worker		0.05	0.03	0.46	0.00	0.16	0.04
	Total		**0.06**	**0.22**	**0.52**	**0.00**	**0.18**	**0.05**
TOTAL			***2.69***	***25.94***	***21.12***	***0.04***	***1.45***	***1.21***
Onsite		**2022**						
	Fugitive Dust		0.00	0.00	0.00	0.00	0.02	0.00
	Off-Road		2.64	25.72	20.59	0.04	1.24	1.16
	Total		**2.64**	**25.72**	**20.59**	**0.04**	**1.27**	**1.16**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.01	0.19	0.07	0.00	0.03	0.01
	Worker		0.05	0.03	0.49	0.00	0.16	0.04
	Total		**0.06**	**0.22**	**0.56**	**0.00**	**0.18**	**0.05**
TOTAL			***2.69***	***25.94***	***21.15***	***0.04***	***1.45***	***1.21***

Asphalt Demolition Debris Haul							
			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2022** Summer						
	Off-Road		0.00	0.00	0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Offsite								
	Hauling		0.01	0.36	0.10	0.00	0.04	0.01
	Vendor		0.00	0.00	0.00	0.00	0.00	0.00
	Worker		0.00	0.00	0.00	0.00	0.00	0.00
	Total		**0.01**	**0.36**	**0.10**	**0.00**	**0.04**	**0.01**
TOTAL			***0.01***	***0.36***	***0.10***	***0.00***	***0.04***	***0.01***
Onsite		**2022** Winter						
	Off-Road		0.00	0.00	0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Offsite								
	Hauling		0.01	0.38	0.10	0.00	0.04	0.01
	Vendor		0.00	0.00	0.00	0.00	0.00	0.00
	Worker		0.00	0.00	0.00	0.00	0.00	0.00
	Total		**0.01**	**0.38**	**0.10**	**0.00**	**0.04**	**0.01**
TOTAL			***0.01***	***0.38***	***0.10***	***0.00***	***0.04***	***0.01***
Onsite		**2022**						
	Off-Road		0.00	0.00	0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Offsite								
	Hauling		0.01	0.38	0.10	0.00	0.04	0.01
	Vendor		0.00	0.00	0.00	0.00	0.00	0.00
	Worker		0.00	0.00	0.00	0.00	0.00	0.00
	Total		**0.01**	**0.38**	**0.10**	**0.00**	**0.04**	**0.01**
TOTAL			***0.01***	***0.38***	***0.10***	***0.00***	***0.04***	***0.01***

Site Preparation

			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2022** Summer						
	Fugitive Dust						8.40	4.32
	Off-Road		3.17	33.08	19.70	0.04	1.61	1.48
	Total		**3.17**	**33.08**	**19.70**	**0.04**	**10.02**	**5.80**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.01	0.18	0.06	0.00	0.03	0.01
	Worker		0.05	0.04	0.59	0.00	0.19	0.05
	Total		**0.06**	**0.22**	**0.66**	**0.00**	**0.21**	**0.06**
TOTAL			***3.23***	***33.30***	***20.35***	***0.04***	***10.23***	***5.86***
Onsite		**2022** Winter						
	Fugitive Dust						8.40	4.32
	Off-Road		3.17	33.08	19.70	0.04	1.61	1.48
	Total		**3.17**	**33.08**	**19.70**	**0.04**	**10.02**	**5.80**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.01	0.19	0.07	0.00	0.03	0.01
	Worker		0.06	0.04	0.55	0.00	0.19	0.05
	Total		**0.07**	**0.23**	**0.62**	**0.00**	**0.21**	**0.06**
TOTAL			***3.24***	***33.31***	***20.31***	***0.04***	***10.23***	***5.86***

Site Preparation Soil Haul

			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2022** Summer						
	Fugitive Dust						0.00	0.00
	Off-Road		0.00	0.00	0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Offsite								
	Hauling		0.01	0.31	0.09	0.00	0.03	0.01
	Vendor		0.00	0.00	0.00	0.00	0.00	0.00
	Worker		0.00	0.00	0.00	0.00	0.00	0.00
	Total		**0.01**	**0.31**	**0.09**	**0.00**	**0.03**	**0.01**
TOTAL			***0.01***	***0.31***	***0.09***	***0.00***	***0.04***	***0.01***
Onsite		**2022** Winter						
	Fugitive Dust						0.00	0.00
	Off-Road		0.00	0.00	0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Offsite								
	Hauling		0.01	0.32	0.09	0.00	0.03	0.01
	Vendor		0.00	0.00	0.00	0.00	0.00	0.00
	Worker		0.00	0.00	0.00	0.00	0.00	0.00
	Total		**0.01**	**0.32**	**0.09**	**0.00**	**0.03**	**0.01**
TOTAL			***0.01***	***0.32***	***0.09***	***0.00***	***0.04***	***0.01***
Onsite		**2022**						
	Fugitive Dust		0.00	0.00	0.00	0.00	0.00	0.00
	Off-Road		0.00	0.00	0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Offsite								
	Hauling		0.01	0.32	0.09	0.00	0.03	0.01
	Vendor		0.00	0.00	0.00	0.00	0.00	0.00
	Worker		0.00	0.00	0.00	0.00	0.00	0.00
	Total		**0.01**	**0.32**	**0.09**	**0.00**	**0.03**	**0.01**
TOTAL			***0.01***	***0.32***	***0.09***	***0.00***	***0.04***	***0.01***

Rough Grading

			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2022** Summer						
	Fugitive Dust						3.93	1.56
	Off-Road		3.62	38.84	29.04	0.06	1.63	1.50
	Total		**3.62**	**38.84**	**29.04**	**0.06**	**5.57**	**3.07**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.01	0.18	0.06	0.00	0.03	0.01
	Worker		0.06	0.04	0.66	0.00	0.21	0.06
	Total		**0.07**	**0.22**	**0.72**	**0.00**	**0.23**	**0.06**
TOTAL			***3.69***	***39.06***	***29.76***	***0.06***	***5.80***	***3.13***
Onsite		**2022** Winter						
	Fugitive Dust						3.93	1.56
	Off-Road		3.62	38.84	29.04	0.06	1.63	1.50
	Total		**3.62**	**38.84**	**29.04**	**0.06**	**5.57**	**3.07**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.01	0.19	0.07	0.00	0.03	0.01
	Worker		0.07	0.04	0.61	0.00	0.21	0.06
	Total		**0.07**	**0.23**	**0.68**	**0.00**	**0.23**	**0.06**
TOTAL			***3.70***	***39.07***	***29.72***	***0.06***	***5.80***	***3.13***
Onsite		**2022**						
	Fugitive Dust		0.00	0.00	0.00	0.00	3.93	1.56
	Off-Road		3.62	38.84	29.04	0.06	1.63	1.50
	Total		**3.62**	**38.84**	**29.04**	**0.06**	**5.57**	**3.07**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.01	0.19	0.07	0.00	0.03	0.01
	Worker		0.07	0.04	0.66	0.00	0.21	0.06
	Total		**0.07**	**0.23**	**0.72**	**0.00**	**0.23**	**0.06**
TOTAL			***3.70***	***39.07***	***29.76***	***0.06***	***5.80***	***3.13***

Utility Trenching

			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2022** Summer						
	Off-Road		0.20	1.78	3.26	0.01	0.09	0.08
	Total		**0.20**	**1.78**	**3.26**	**0.01**	**0.09**	**0.08**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.00	0.00	0.00	0.00	0.00	0.00
	Worker		0.01	0.01	0.10	0.00	0.03	0.01
	Total		**0.01**	**0.01**	**0.10**	**0.00**	**0.03**	**0.01**
TOTAL			***0.21***	***1.78***	***3.35***	***0.01***	***0.12***	***0.09***
Onsite		**2022** Winter						
	Off-Road		0.20	1.78	3.26	0.01	0.09	0.08
	Total		**0.20**	**1.78**	**3.26**	**0.01**	**0.09**	**0.08**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.00	0.00	0.00	0.00	0.00	0.00
	Worker		0.01	0.01	0.09	0.00	0.03	0.01
	Total		**0.01**	**0.01**	**0.09**	**0.00**	**0.03**	**0.01**
TOTAL			***0.21***	***1.78***	***3.35***	***0.01***	***0.12***	***0.09***
Onsite		**2022**						
	Off-Road		0.20	1.78	3.26	0.01	0.09	0.08
	Total		**0.20**	**1.78**	**3.26**	**0.01**	**0.09**	**0.08**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.00	0.00	0.00	0.00	0.00	0.00
	Worker		0.01	0.01	0.10	0.00	0.03	0.01
	Total		**0.01**	**0.01**	**0.10**	**0.00**	**0.03**	**0.01**
TOTAL			***0.21***	***1.78***	***3.35***	***0.01***	***0.12***	***0.09***

Fine Grading

			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2022** Summer						
	Fugitive Dust						3.93	1.56
	Off-Road		3.62	38.84	29.04	0.06	1.63	1.50
	Total		**3.62**	**38.84**	**29.04**	**0.06**	**5.57**	**3.07**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.01	0.18	0.06	0.00	0.03	0.01
	Worker		0.06	0.04	0.66	0.00	0.21	0.06
	Total		**0.07**	**0.22**	**0.72**	**0.00**	**0.23**	**0.06**
TOTAL			***3.69***	***39.06***	***29.76***	***0.06***	***5.80***	***3.13***
Onsite		**2022** Winter						
	Fugitive Dust						3.93	1.56
	Off-Road		3.62	38.84	29.04	0.06	1.63	1.50
	Total		**3.62**	**38.84**	**29.04**	**0.06**	**5.57**	**3.07**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.01	0.19	0.07	0.00	0.03	0.01
	Worker		0.07	0.04	0.61	0.00	0.21	0.06
	Total		**0.07**	**0.23**	**0.68**	**0.00**	**0.23**	**0.06**
TOTAL			***3.70***	***39.07***	***29.72***	***0.06***	***5.80***	***3.13***

			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2022**	0.00	0.00	0.00	0.00	3.93	1.56
	Fugitive Dust							
	Off-Road		3.62	38.84	29.04	0.06	1.63	1.50
	Total		**3.62**	**38.84**	**29.04**	**0.06**	**5.57**	**3.07**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.01	0.19	0.07	0.00	0.03	0.01
	Worker		0.07	0.04	0.66	0.00	0.21	0.06
	Total		**0.07**	**0.23**	**0.72**	**0.00**	**0.23**	**0.06**
TOTAL			***3.70***	***39.07***	***29.76***	***0.06***	***5.80***	***3.13***

Asphalt Paving

			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2022** Summer						
	Off-Road		1.10	11.12	14.58	0.02	0.57	0.52
	Paving		0.17				0.00	0.00
	Total		**1.27**	**11.12**	**14.58**	**0.02**	**0.57**	**0.52**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.00	0.00	0.00	0.00	0.00	0.00
	Worker		0.05	0.03	0.49	0.00	0.16	0.04
	Total		**0.05**	**0.03**	**0.49**	**0.00**	**0.16**	**0.04**
TOTAL			***1.31***	***11.16***	***15.07***	***0.02***	***0.72***	***0.56***
Onsite		**2022** Winter						
	Off-Road		1.10	11.12	14.58	0.02	0.57	0.52
	Paving		0.17				0.00	0.00
	Total		**1.27**	**11.12**	**14.58**	**0.02**	**0.57**	**0.52**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.00	0.00	0.00	0.00	0.00	0.00
	Worker		0.05	0.03	0.46	0.00	0.16	0.04
	Total		**0.05**	**0.03**	**0.46**	**0.00**	**0.16**	**0.04**
TOTAL			***1.32***	***11.16***	***15.04***	***0.02***	***0.72***	***0.56***

			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2022**						
	Off-Road		1.10	11.12	14.58	0.02	0.57	0.52
	Paving		0.17	0.00	0.00	0.00	0.00	0.00
	Total		**1.27**	**11.12**	**14.58**	**0.02**	**0.57**	**0.52**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.00	0.00	0.00	0.00	0.00	0.00
	Worker		0.05	0.03	0.49	0.00	0.16	0.04
	Total		**0.05**	**0.03**	**0.49**	**0.00**	**0.16**	**0.04**
TOTAL			***1.32***	***11.16***	***15.07***	***0.02***	***0.72***	***0.56***

Finishing/Landscaping							
			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2022** Summer						
	Off-Road		0.20	1.79	3.27	0.01	0.09	0.08
	Total		**0.20**	**1.79**	**3.27**	**0.01**	**0.09**	**0.08**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.13	3.63	1.29	0.02	0.52	0.17
	Worker		0.63	0.42	6.87	0.02	2.17	0.59
	Total		**0.76**	**4.06**	**8.16**	**0.04**	**2.69**	**0.76**
TOTAL			***0.97***	***5.84***	***11.43***	***0.04***	***2.77***	***0.84***
Onsite		**2022** Winter						
	Off-Road		0.20	1.79	3.27	0.01	0.09	0.08
	Total		**0.20**	**1.79**	**3.27**	**0.01**	**0.09**	**0.08**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.13	3.78	1.34	0.02	0.52	0.17
	Worker		0.68	0.46	6.39	0.02	2.17	0.59
	Total		**0.82**	**4.24**	**7.73**	**0.03**	**2.69**	**0.76**
TOTAL			***1.02***	***6.03***	***11.00***	***0.04***	***2.77***	***0.84***
Onsite		**2022**						
	Off-Road		0.20	1.79	3.27	0.01	0.09	0.08
	Total		**0.20**	**1.79**	**3.27**	**0.01**	**0.09**	**0.08**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.13	3.78	1.34	0.02	0.52	0.17
	Worker		0.68	0.46	6.87	0.02	2.17	0.59
	Total		**0.82**	**4.24**	**8.16**	**0.04**	**2.69**	**0.76**
TOTAL			***1.02***	***6.03***	***11.43***	***0.04***	***2.77***	***0.84***

Finishing/Landscaping							
			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2023** Summer						
	Off-Road		0.19	1.56	3.27	0.01	0.08	0.07
	Total		**0.19**	**1.56**	**3.27**	**0.01**	**0.08**	**0.07**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.08	2.84	1.18	0.01	0.50	0.15
	Worker		0.59	0.38	6.38	0.02	2.17	0.59
	Total		**0.67**	**3.22**	**7.56**	**0.03**	**2.66**	**0.74**
TOTAL			***0.86***	***4.77***	***10.83***	***0.04***	***2.74***	***0.81***
Onsite		**2023** Winter						
	Off-Road		0.19	1.56	3.27	0.01	0.08	0.07
	Total		**0.19**	**1.56**	**3.27**	**0.01**	**0.08**	**0.07**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.08	2.97	1.21	0.01	0.50	0.15
	Worker		0.64	0.41	5.95	0.02	2.17	0.59
	Total		**0.72**	**3.38**	**7.16**	**0.03**	**2.66**	**0.74**
TOTAL			***0.91***	***4.94***	***10.43***	***0.04***	***2.74***	***0.81***
Onsite		**2023**						
	Off-Road		0.19	1.56	3.27	0.01	0.08	0.07
	Total		**0.19**	**1.56**	**3.27**	**0.01**	**0.08**	**0.07**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.08	2.97	1.21	0.01	0.50	0.15
	Worker		0.64	0.41	6.38	0.02	2.17	0.59
	Total		**0.72**	**3.38**	**7.56**	**0.03**	**2.66**	**0.74**
TOTAL			***0.91***	***4.94***	***10.83***	***0.04***	***2.74***	***0.81***

Architectural Coating							
			ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite		**2022** Summer						
	Architectural Coating		7.01				0.00	0.00
	Off-Road		0.20	1.41	1.81	0.00	0.08	0.08
	Total		**7.21**	**1.41**	**1.81**	**0.00**	**0.08**	**0.08**
Offsite								
	Hauling		0.00	0.00	0.00	0.00	0.00	0.00
	Vendor		0.00	0.00	0.00	0.00	0.00	0.00
	Worker		0.13	0.08	1.38	0.00	0.44	0.12
	Total		**0.13**	**0.08**	**1.38**	**0.00**	**0.44**	**0.12**
TOTAL			***7.34***	***1.49***	***3.19***	***0.01***	***0.52***	***0.20***

Onsite		**2022** Winter					
	Architectural Coating	7.01				0.00	0.00
	Off-Road	0.20	1.41	1.81	0.00	0.08	0.08
	Total	**7.21**	**1.41**	**1.81**	**0.00**	**0.08**	**0.08**
Offsite							
	Hauling	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.14	0.09	1.28	0.00	0.44	0.12
	Total	**0.14**	**0.09**	**1.28**	**0.00**	**0.44**	**0.12**
TOTAL		***7.35***	***1.50***	***3.10***	***0.01***	***0.52***	***0.20***
Onsite		**2022**					
	Architectural Coating	7.01	0.00	0.00	0.00	0.00	0.00
	Off-Road	0.20	1.41	1.81	0.00	0.08	0.08
	Total	**7.21**	**1.41**	**1.81**	**0.00**	**0.08**	**0.08**
Offsite							
	Hauling	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.14	0.09	1.38	0.00	0.44	0.12
	Total	**0.14**	**0.09**	**1.38**	**0.00**	**0.44**	**0.12**
TOTAL		***7.35***	***1.50***	***3.19***	***0.01***	***0.52***	***0.20***

	ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Asphalt Demolition, Site Preparation	*6*	*59*	*42*	*0*	*12*	*7*
Asphalt Demolition and Debris Haul, Site Preparation	*6*	*60*	*42*	*0*	*12*	*7*
Site Preparation, Rough Grading, Utilities Trenching	*7*	*74*	*53*	*0*	*16*	*9*
Site Preparation and Soil Haul, Rough Grading, Utilities Trenching	*7*	*74*	*54*	*0*	*16*	*9*
Fine Grading and Finishing/Landscaping	*5*	*45*	*41*	*0*	*9*	*4*
Fine Grading, Paving, and Finishing/Landscaping 2022	*6*	*56*	*56*	*0*	*9*	*5*
Asphalt Paving and Finishing/Landscaping 2022	*2*	*17*	*27*	*0*	*3*	*1*
Finishing/Landscaping 2022	*1*	*6*	*11*	*0*	*3*	*1*
Finishing/Landscaping 2022 and Architectural Coating	*8*	*8*	*15*	*0*	*3*	*1*
Finishing/Landscaping 2023	*1*	*5*	*11*	*0*	*3*	*1*
MAX DAILY	**8**	**74**	**56**	**0**	**16**	**9**
Regional Thresholds	**75**	**100**	**550**	**150**	**150**	**55**
Exceeds Thresholds?	**No**	No	No	No	No	No

Construction LST Worksheet:

Asphalt Demolition			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2022**				
	Fugitive Dust				0.02	0.00
	Off-Road		25.72	20.59	1.24	1.16
	Total		**25.72**	**20.59**	**1.27**	**1.16**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***25.72***	***20.59***	***1.27***	***1.16***
Onsite		**2022**				
	Fugitive Dust				0.02	0.00
	Off-Road		25.72	20.59	1.24	1.16
	Total		**25.72**	**20.59**	**1.27**	**1.16**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***25.72***	***20.59***	***1.27***	***1.16***
Onsite		**2022**				
	Fugitive Dust		0.00	0.00	0.02	0.00
	Off-Road		25.72	20.59	1.24	1.16
	Total		**25.72**	**20.59**	**1.27**	**1.16**
Offsite						
	Hauling		0.00	0.00	0.00	0.00
	Vendor		0.00	0.00	0.00	0.00
	Worker		0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**
TOTAL			***25.72***	***20.59***	***1.27***	***1.16***

Asphalt Demolition Debris Haul			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2022**				
	Off-Road		0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***0.00***	***0.00***	***0.00***	***0.00***
Onsite		**2022**				
	Off-Road		0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***0.00***	***0.00***	***0.00***	***0.00***
Onsite		**2022**				
	Off-Road		0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**
Offsite						

	Hauling		0.00	0.00	0.00	0.00
	Vendor		0.00	0.00	0.00	0.00
	Worker		0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**
TOTAL			***0.00***	***0.00***	***0.00***	***0.00***

Site Preparation						
			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2022**				
	Fugitive Dust				8.40	4.32
	Off-Road		33.08	19.70	1.61	1.48
	Total		**33.08**	**19.70**	**10.02**	**5.80**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***33.08***	***19.70***	***10.02***	***5.80***
Onsite		**2022**				
	Fugitive Dust				8.40	4.32
	Off-Road		33.08	19.70	1.61	1.48
	Total		**33.08**	**19.70**	**10.02**	**5.80**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***33.08***	***19.70***	***10.02***	***5.80***
Onsite		**2022**				
	Fugitive Dust		0.00	0.00	8.40	4.32
	Off-Road		33.08	19.70	1.61	1.48
	Total		**33.08**	**19.70**	**10.02**	**5.80**
Offsite						
	Hauling		0.00	0.00	0.00	0.00
	Vendor		0.00	0.00	0.00	0.00
	Worker		0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**
TOTAL			***33.08***	***19.70***	***10.02***	***5.80***

Site Preparation Soil Haul

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2022**				
	Fugitive Dust				0.00	0.00
	Off-Road		0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***0.00***	***0.00***	***0.00***	***0.00***
Onsite		**2022**				
	Fugitive Dust				0.00	0.00
	Off-Road		0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***0.00***	***0.00***	***0.00***	***0.00***
Onsite		**2022**				
	Fugitive Dust		0.00	0.00	0.00	0.00
	Off-Road		0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**
Offsite						
	Hauling		0.00	0.00	0.00	0.00
	Vendor		0.00	0.00	0.00	0.00
	Worker		0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**
TOTAL			***0.00***	***0.00***	***0.00***	***0.00***

Rough Grading

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2022**				
	Fugitive Dust				3.93	1.56
	Off-Road		38.84	29.04	1.63	1.50
	Total		**38.84**	**29.04**	**5.57**	**3.07**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***38.84***	***29.04***	***5.57***	***3.07***
Onsite		**2022**				
	Fugitive Dust				3.93	1.56
	Off-Road		38.84	29.04	1.63	1.50
	Total		**38.84**	**29.04**	**5.57**	**3.07**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***38.84***	***29.04***	***5.57***	***3.07***
Onsite		**2022**				
	Fugitive Dust		0.00	0.00	3.93	1.56
	Off-Road		38.84	29.04	1.63	1.50
	Total		**38.84**	**29.04**	**5.57**	**3.07**
Offsite						

	Hauling	0.00	0.00	0.00	0.00
	Vendor	0.00	0.00	0.00	0.00
	Worker	0.00	0.00	0.00	0.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**
TOTAL		***38.84***	***29.04***	***5.57***	***3.07***

Utility Trenching

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2022**				
	Off-Road		1.78	3.26	0.09	0.08
	Total		**1.78**	**3.26**	**0.09**	**0.08**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***1.78***	***3.26***	***0.09***	***0.08***
Onsite		**2022**				
	Off-Road		1.78	3.26	0.09	0.08
	Total		**1.78**	**3.26**	**0.09**	**0.08**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***1.78***	***3.26***	***0.09***	***0.08***
Onsite		**2022**				
	Off-Road		1.78	3.26	0.09	0.08
	Total		**1.78**	**3.26**	**0.09**	**0.08**
Offsite						
	Hauling		0.00	0.00	0.00	0.00
	Vendor		0.00	0.00	0.00	0.00
	Worker		0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**
TOTAL			***1.78***	***3.26***	***0.09***	***0.08***

Fine Grading

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2022**				

	Fugitive Dust				3.93	1.56
	Off-Road		38.84	29.04	1.63	1.50
	Total		**38.84**	**29.04**	**5.57**	**3.07**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***38.84***	***29.04***	***5.57***	***3.07***
Onsite		**2022**				
	Fugitive Dust				3.93	1.56
	Off-Road		38.84	29.04	1.63	1.50
	Total		**38.84**	**29.04**	**5.57**	**3.07**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***38.84***	***29.04***	***5.57***	***3.07***
Onsite		**2022**				
	Fugitive Dust		0.00	0.00	3.93	1.56
	Off-Road		38.84	29.04	1.63	1.50
	Total		**38.84**	**29.04**	**5.57**	**3.07**
Offsite						
	Hauling		0.00	0.00	0.00	0.00
	Vendor		0.00	0.00	0.00	0.00
	Worker		0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**
TOTAL			***38.84***	***29.04***	***5.57***	***3.07***

Asphalt Paving

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2022**				
	Off-Road		11.12	14.58	0.57	0.52
	Paving				0.00	0.00
	Total		**11.12**	**14.58**	**0.57**	**0.52**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***11.12***	***14.58***	***0.57***	***0.52***
Onsite		**2022**				
	Off-Road		11.12	14.58	0.57	0.52
	Paving				0.00	0.00
	Total		**11.12**	**14.58**	**0.57**	**0.52**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***11.12***	***14.58***	***0.57***	***0.52***
Onsite		**2022**				
	Off-Road		11.12	14.58	0.57	0.52
	Paving		0.00	0.00	0.00	0.00
	Total		**11.12**	**14.58**	**0.57**	**0.52**
Offsite						
	Hauling		0.00	0.00	0.00	0.00
	Vendor		0.00	0.00	0.00	0.00
	Worker		0.00	0.00	0.00	0.00

	Total		**0.00**	**0.00**	**0.00**	**0.00**
TOTAL			***11.12***	***14.58***	***0.57***	***0.52***

Finishing/Landscaping						
			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2022**				
	Off-Road		1.79	3.27	0.09	0.08
	Total		**1.79**	**3.27**	**0.09**	**0.08**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***1.79***	***3.27***	***0.09***	***0.08***
Onsite		**2022**				
	Off-Road		1.79	3.27	0.09	0.08
	Total		**1.79**	**3.27**	**0.09**	**0.08**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***1.79***	***3.27***	***0.09***	***0.08***
Onsite		**2022**				
	Off-Road		1.79	3.27	0.09	0.08
	Total		**1.79**	**3.27**	**0.09**	**0.08**
Offsite						
	Hauling		0.00	0.00	0.00	0.00
	Vendor		0.00	0.00	0.00	0.00
	Worker		0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**
TOTAL			***1.79***	***3.27***	***0.09***	***0.08***

Finishing/Landscaping						
			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2023**				
	Off-Road		1.56	3.27	0.08	0.07
	Total		**1.56**	**3.27**	**0.08**	**0.07**
Offsite						

	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***1.56***	***3.27***	***0.08***	***0.07***
Onsite		**2023**				
	Off-Road		1.56	3.27	0.08	0.07
	Total		**1.56**	**3.27**	**0.08**	**0.07**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***1.56***	***3.27***	***0.08***	***0.07***
Onsite		**2023**				
	Off-Road		1.56	3.27	0.08	0.07
	Total		**1.56**	**3.27**	**0.08**	**0.07**
Offsite						
	Hauling		0.00	0.00	0.00	0.00
	Vendor		0.00	0.00	0.00	0.00
	Worker		0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**
TOTAL			***1.56***	***3.27***	***0.08***	***0.07***

Architectural Coating

			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2022**				
	Architectural Coating				0.00	0.00
	Off-Road		1.41	1.81	0.08	0.08
	Total		**1.41**	**1.81**	**0.08**	**0.08**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***1.41***	***1.81***	***0.08***	***0.08***
Onsite		**2022**				
	Architectural Coating				0.00	0.00
	Off-Road		1.41	1.81	0.08	0.08
	Total		**1.41**	**1.81**	**0.08**	**0.08**
Offsite						
	Hauling					
	Vendor					
	Worker					
	Total					
TOTAL			***1.41***	***1.81***	***0.08***	***0.08***
Onsite		**2022**				
	Architectural Coating		0.00	0.00	0.00	0.00
	Off-Road		1.41	1.81	0.08	0.08
	Total		**1.41**	**1.81**	**0.08**	**0.08**
Offsite						
	Hauling		0.00	0.00	0.00	0.00
	Vendor		0.00	0.00	0.00	0.00
	Worker		0.00	0.00	0.00	0.00
	Total		**0.00**	**0.00**	**0.00**	**0.00**
TOTAL			***1.41***	***1.81***	***0.08***	***0.08***

	NOx	CO	PM10 Total	PM2.5 Total
Asphalt Demolition, Site Preparation	***59***	***40***	***11.28***	***6.96***

4.5 Acre LST	*180*	*1,907*	*30*	*10*
Exceeds LST?	*no*	*no*	*no*	*no*
Asphalt Demolition and Debris Haul, Site Preparation	*59*	*40*	*11.28*	*6.96*
4.5 Acre LST	*180*	*1,907*	*30*	*10*
Exceeds LST?	*no*	*no*	*no*	*no*
Site Preparation, Rough Grading, Utilities Trenching	*74*	*52*	*15.67*	*8.95*
5 Acre LST	*190*	*2,051*	*33*	*10*
Exceeds LST?	*no*	*no*	*no*	*no*
Site Preparation and Soil Haul, Rough Grading, Utilities Trenching	*74*	*52*	*15.67*	*8.95*
5 Acre LST	*190*	*2,051*	*33*	*10*
Exceeds LST?	*no*	*no*	*no*	*no*
Fine Grading and Finishing/Landscaping 2022	*41*	*32*	*5.66*	*3.15*
4.0 Acre LST	*169*	*1,763*	*27*	*9*
Exceeds LST?	*no*	*no*	*no*	*no*
Fine Grading, Paving, and Finishing/Landscaping 2022	*52*	*47*	*6.22*	*3.67*
4.0 Acre LST	*169*	*1,763*	*27*	*9*
Exceeds LST?	*no*	*no*	*no*	*no*
Asphalt Paving and Finishing/Landscaping 2022	*13*	*18*	*0.65*	*0.60*
≤ 1 Acre LST	*93*	*810*	*10*	*4*
Exceeds LST?	*no*	*no*	*no*	*no*
Finishing/Landscaping 2022	*2*	*3*	*0.09*	*0.08*
≤ 1 Acre LST	*93*	*810*	*10*	*4*
Exceeds LST?	*no*	*no*	*no*	*no*
Finishing/Landscaping 2022 and Architectural Coating	*3*	*5*	*0.17*	*0.16*
≤ 1 Acre LST	*93*	*810*	*10*	*4*
Exceeds LST?	*no*	*no*	*no*	*no*
Finishing/Landscaping 2023	*2*	*3*	*0.08*	*0.07*
≤ 1 Acre LST	*93*	*810*	*10*	*4*
Exceeds LST?	*no*	*no*	*no*	*no*

GHG Emissions Inventory

Proposed Project Buildout

Construction*

	$MTCO_2e$
2022	489
Total Construction	**489**
30-Year Amortization[1]	**16**

*CalEEMod, Version 2020.4

Operation*

	$MTCO_2e$/Year		$MTCO_2e$/Year		$MTCO_2e$/Year
	Existing Conditions (2021)	**%**	**Proposed Project (2023)**	**%**	**Net**
Area	0.0003	0	0.01	0	0.005
Energy	13	2%	14	1%	2
Mobile	609	93%	1,037	92%	428
Solid Waste	0	0%	1	0%	0
Water	24	4%	39	3%	15
Lighting Energy	7	1%	20	2%	14
Amortized Construction Emissions***		0%	16	1%	16
	653	100%	**1,128**	100%	**475**
			South Coast AQMD Bright-Line Screening Threshold		3,000
			Exceed Threshold?		**No**

*CalEEMod, Version 2020.4

** $MTCO_2e$=metric tons of carbon dioxide equivalent.

*** Total construction emissions are amortized over 30 years per SCAQMD methodology; SCAQMD. 2009, November 19. Greenhouse Gases (GHG) CEQA Significance Thresholds Working Group Meeting 14. http://www.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/year-2008-2009/ghg-meeting-14/ghg-meeting-14-main-presentation.pdf?sfvrsn=2.

CalEEMod Construction Model

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Oak Creek Community Park Expansion & Improvement Plan

Orange County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
City Park	8.55	Acre	8.55	372,427.00	0
Parking Lot	0.51	Acre	0.51	22,401.00	0
Other Asphalt Surfaces	0.89	Acre	0.89	38,586.00	0
Other Non-Asphalt Surfaces	1.47	Acre	1.47	64,956.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2023
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	509.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Based on 2020 Sustainability Report.

Land Use - Based on Applicant info. (see assumptions file)

Construction Phase - Based on applicant info. (see assumptions file)

Off-road Equipment - No additional equipment for Asphalt Demolition Debris Haul

Off-road Equipment -

Off-road Equipment - No additional equipment required for Site Prep Soil Haul Phase

Off-road Equipment -

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Off-road Equipment - 1 Excavator based on equipment mix of projects of a similar size

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - 1 Excavator based on equipment mix of projects of a similar size

Off-road Equipment -

Grading -

Demolition -

Trips and VMT - Assume 4 vt/day/water trucks, See assumptions file

Construction Off-road Equipment Mitigation - SCAQMD Rule 403 and Rule 1186

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	CleanPavedRoadPercentReduction	0	9
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	20.00	23.00
tblConstructionPhase	NumDays	20.00	3.00
tblConstructionPhase	NumDays	10.00	44.00
tblConstructionPhase	NumDays	10.00	5.00
tblConstructionPhase	NumDays	30.00	21.00
tblConstructionPhase	NumDays	30.00	23.00
tblConstructionPhase	NumDays	20.00	22.00
tblConstructionPhase	NumDays	20.00	5.00
tblConstructionPhase	PhaseEndDate	6/28/2022	7/1/2022
tblGrading	MaterialImported	0.00	80.00
tblLandUse	LandUseSquareFeet	372,438.00	372,427.00
tblLandUse	LandUseSquareFeet	22,215.60	22,401.00
tblLandUse	LandUseSquareFeet	38,768.40	38,586.00
tblLandUse	LandUseSquareFeet	64,033.20	64,956.00
tblOffRoadEquipment	LoadFactor	0.38	0.38

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	390.98	509.98
tblTripsAndVMT	HaulingTripNumber	6.00	0.00
tblTripsAndVMT	HaulingTripNumber	0.00	7.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	81.00
tblTripsAndVMT	WorkerTripNumber	3.00	209.00

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.2710	2.3682	2.1592	5.3200e-003	0.8044	0.1006	0.9050	0.3482	0.0928	0.4410	0.0000	482.1430	482.1430	0.0981	0.0154	489.1684
2023	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.2710**	**2.3682**	**2.1592**	**5.3200e-003**	**0.8044**	**0.1006**	**0.9050**	**0.3482**	**0.0928**	**0.4410**	**0.0000**	**482.1430**	**482.1430**	**0.0981**	**0.0154**	**489.1684**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.2710	2.3682	2.1592	5.3200e-003	0.4278	0.1006	0.5283	0.1718	0.0928	0.2646	0.0000	482.1426	482.1426	0.0981	0.0154	489.1680
2023	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.2710**	**2.3682**	**2.1592**	**5.3200e-003**	**0.4278**	**0.1006**	**0.5283**	**0.1718**	**0.0928**	**0.2646**	**0.0000**	**482.1426**	**482.1426**	**0.0981**	**0.0154**	**489.1680**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**46.82**	**0.00**	**41.62**	**50.67**	**0.00**	**40.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	6-1-2022	8-31-2022	2.1646	2.1646
2	9-1-2022	11-30-2022	0.4019	0.4019
3	12-1-2022	2-28-2023	0.0801	0.0801
		Highest	2.1646	2.1646

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0134	0.0000	1.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.8000e-004	2.8000e-004	0.0000	0.0000	3.0000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.8137	1.8137	1.2000e-004	1.0000e-005	1.8208
Mobile	4.4700e-003	4.9500e-003	0.0444	1.0000e-004	0.0107	7.0000e-005	0.0107	2.8400e-003	6.0000e-005	2.9100e-003	0.0000	9.2093	9.2093	5.9000e-004	4.0000e-004	9.3435
Waste						0.0000	0.0000		0.0000	0.0000	0.1502	0.0000	0.1502	8.8800e-003	0.0000	0.3722
Water						0.0000	0.0000		0.0000	0.0000	0.0000	26.1810	26.1810	1.6900e-003	2.1000e-004	26.2846
Total	**0.0179**	**4.9500e-003**	**0.0446**	**1.0000e-004**	**0.0107**	**7.0000e-005**	**0.0107**	**2.8400e-003**	**6.0000e-005**	**2.9100e-003**	**0.1502**	**37.2042**	**37.3544**	**0.0113**	**6.2000e-004**	**37.8213**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0134	0.0000	1.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.8000e-004	2.8000e-004	0.0000	0.0000	3.0000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.8137	1.8137	1.2000e-004	1.0000e-005	1.8208
Mobile	4.4700e-003	4.9500e-003	0.0444	1.0000e-004	0.0107	7.0000e-005	0.0107	2.8400e-003	6.0000e-005	2.9100e-003	0.0000	9.2093	9.2093	5.9000e-004	4.0000e-004	9.3435
Waste						0.0000	0.0000		0.0000	0.0000	0.1502	0.0000	0.1502	8.8800e-003	0.0000	0.3722
Water						0.0000	0.0000		0.0000	0.0000	0.0000	26.1810	26.1810	1.6900e-003	2.1000e-004	26.2846
Total	**0.0179**	**4.9500e-003**	**0.0446**	**1.0000e-004**	**0.0107**	**7.0000e-005**	**0.0107**	**2.8400e-003**	**6.0000e-005**	**2.9100e-003**	**0.1502**	**37.2042**	**37.3544**	**0.0113**	**6.2000e-004**	**37.8213**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Asphalt Demolition	Demolition	6/1/2022	7/1/2022	5	23	a
2	Asphalt Demolition Debris Haul	Demolition	6/29/2022	7/1/2022	5	3	b
3	Site Preparation	Site Preparation	6/1/2022	8/1/2022	5	44	c
4	Site Preparation Soil Haul	Site Preparation	7/26/2022	8/1/2022	5	5	d
5	Rough Grading	Grading	7/2/2022	8/1/2022	5	21	e
6	Utility Trenching	Trenching	7/2/2022	8/1/2022	5	21	f
7	Fine Grading	Grading	8/2/2022	9/1/2022	5	23	g
8	Asphalt Paving	Paving	9/1/2022	10/1/2022	5	22	h

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

9	Finishing/Landscaping	Trenching	8/2/2022	1/1/2023	5	109	i
10	Architectural Coating	Architectural Coating	11/1/2022	11/7/2022	5	5	j

Acres of Grading (Site Preparation Phase): 66

Acres of Grading (Grading Phase): 63

Acres of Paving: 2.87

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 7,557 (Architectural Coating

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Asphalt Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Asphalt Demolition Debris Haul	Concrete/Industrial Saws	0	8.00	81	0.73
Asphalt Demolition	Excavators	3	8.00	158	0.38
Asphalt Demolition Debris Haul	Excavators	0	8.00	158	0.38
Rough Grading	Excavators	2	8.00	158	0.38
Fine Grading	Excavators	2	8.00	158	0.38
Rough Grading	Graders	1	8.00	187	0.41
Fine Grading	Graders	1	8.00	187	0.41
Asphalt Paving	Pavers	2	8.00	130	0.42
Asphalt Paving	Paving Equipment	2	8.00	132	0.36
Asphalt Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Asphalt Paving	Rollers	2	8.00	80	0.38
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Asphalt Demolition Debris Haul	Rubber Tired Dozers	0	8.00	247	0.40
Rough Grading	Rubber Tired Dozers	1	8.00	247	0.40
Fine Grading	Rubber Tired Dozers	1	8.00	247	0.40

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Preparation Soil Haul	Rubber Tired Dozers	0	8.00	247	0.40
Rough Grading	Scrapers	2	8.00	367	0.48
Fine Grading	Scrapers	2	8.00	367	0.48
Rough Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Fine Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Site Preparation Soil Haul	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Utility Trenching	Excavators	1	8.00	158	0.38
Finishing/Landscaping	Excavators	1	8.00	158	0.38

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Asphalt Demolition	6	15.00	4.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	4.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Asphalt Demolition Debris Haul	0	0.00	0.00	7.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation Soil Haul	0	0.00	0.00	10.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Rough Grading	8	20.00	4.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	42.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Utility Trenching	1	3.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Fine Grading	8	20.00	4.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Asphalt Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Finishing/Landscaping	1	209.00	81.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Replace Ground Cover

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Asphalt Demolition - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.5000e-004	0.0000	6.5000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0304	0.2958	0.2368	4.5000e-004		0.0143	0.0143		0.0133	0.0133	0.0000	39.0888	39.0888	0.0110	0.0000	39.3633
Total	**0.0304**	**0.2958**	**0.2368**	**4.5000e-004**	**6.5000e-004**	**0.0143**	**0.0149**	**1.0000e-004**	**0.0133**	**0.0134**	**0.0000**	**39.0888**	**39.0888**	**0.0110**	**0.0000**	**39.3633**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	8.0000e-005	2.1600e-003	7.4000e-004	1.0000e-005	2.9000e-004	2.0000e-005	3.1000e-004	8.0000e-005	2.0000e-005	1.0000e-004	0.0000	0.8654	0.8654	5.0000e-005	1.2000e-004	0.9037
Worker	5.2000e-004	3.9000e-004	5.4000e-003	2.0000e-005	1.8900e-003	1.0000e-005	1.9000e-003	5.0000e-004	1.0000e-005	5.1000e-004	0.0000	1.4870	1.4870	4.0000e-005	4.0000e-005	1.4991
Total	**6.0000e-004**	**2.5500e-003**	**6.1400e-003**	**3.0000e-005**	**2.1800e-003**	**3.0000e-005**	**2.2100e-003**	**5.8000e-004**	**3.0000e-005**	**6.1000e-004**	**0.0000**	**2.3525**	**2.3525**	**9.0000e-005**	**1.6000e-004**	**2.4028**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.8000e-004	0.0000	2.8000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0304	0.2958	0.2368	4.5000e-004		0.0143	0.0143		0.0133	0.0133	0.0000	39.0887	39.0887	0.0110	0.0000	39.3632
Total	**0.0304**	**0.2958**	**0.2368**	**4.5000e-004**	**2.8000e-004**	**0.0143**	**0.0146**	**4.0000e-005**	**0.0133**	**0.0133**	**0.0000**	**39.0887**	**39.0887**	**0.0110**	**0.0000**	**39.3632**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	8.0000e-005	2.1600e-003	7.4000e-004	1.0000e-005	2.7000e-004	2.0000e-005	2.9000e-004	8.0000e-005	2.0000e-005	1.0000e-004	0.0000	0.8654	0.8654	5.0000e-005	1.2000e-004	0.9037
Worker	5.2000e-004	3.9000e-004	5.4000e-003	2.0000e-005	1.7500e-003	1.0000e-005	1.7600e-003	4.7000e-004	1.0000e-005	4.8000e-004	0.0000	1.4870	1.4870	4.0000e-005	4.0000e-005	1.4991
Total	**6.0000e-004**	**2.5500e-003**	**6.1400e-003**	**3.0000e-005**	**2.0200e-003**	**3.0000e-005**	**2.0500e-003**	**5.5000e-004**	**3.0000e-005**	**5.8000e-004**	**0.0000**	**2.3525**	**2.3525**	**9.0000e-005**	**1.6000e-004**	**2.4028**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.3 Asphalt Demolition Debris Haul - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-005	5.7000e-004	1.5000e-004	0.0000	6.0000e-005	0.0000	6.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.2147	0.2147	2.0000e-005	3.0000e-005	0.2255
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**1.0000e-005**	**5.7000e-004**	**1.5000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.2147**	**0.2147**	**2.0000e-005**	**3.0000e-005**	**0.2255**

Mitigated Construction On-Site

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-005	5.7000e-004	1.5000e-004	0.0000	6.0000e-005	0.0000	6.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.2147	0.2147	2.0000e-005	3.0000e-005	0.2255
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**1.0000e-005**	**5.7000e-004**	**1.5000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.2147**	**0.2147**	**2.0000e-005**	**3.0000e-005**	**0.2255**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.4 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.4325	0.0000	0.4325	0.2223	0.0000	0.2223	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0697	0.7278	0.4334	8.4000e-004		0.0355	0.0355		0.0326	0.0326	0.0000	73.5667	73.5667	0.0238	0.0000	74.1615
Total	**0.0697**	**0.7278**	**0.4334**	**8.4000e-004**	**0.4325**	**0.0355**	**0.4679**	**0.2223**	**0.0326**	**0.2549**	**0.0000**	**73.5667**	**73.5667**	**0.0238**	**0.0000**	**74.1615**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.5000e-004	4.1400e-003	1.4200e-003	2.0000e-005	5.5000e-004	4.0000e-005	5.9000e-004	1.6000e-004	4.0000e-005	2.0000e-004	0.0000	1.6556	1.6556	9.0000e-005	2.4000e-004	1.7287
Worker	1.1900e-003	9.0000e-004	0.0124	4.0000e-005	4.3500e-003	2.0000e-005	4.3700e-003	1.1500e-003	2.0000e-005	1.1800e-003	0.0000	3.4137	3.4137	8.0000e-005	9.0000e-005	3.4414
Total	**1.3400e-003**	**5.0400e-003**	**0.0138**	**6.0000e-005**	**4.9000e-003**	**6.0000e-005**	**4.9600e-003**	**1.3100e-003**	**6.0000e-005**	**1.3800e-003**	**0.0000**	**5.0693**	**5.0693**	**1.7000e-004**	**3.3000e-004**	**5.1701**

Mitigated Construction On-Site

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1849	0.0000	0.1849	0.0950	0.0000	0.0950	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0697	0.7278	0.4334	8.4000e-004		0.0355	0.0355		0.0326	0.0326	0.0000	73.5666	73.5666	0.0238	0.0000	74.1614
Total	**0.0697**	**0.7278**	**0.4334**	**8.4000e-004**	**0.1849**	**0.0355**	**0.2204**	**0.0950**	**0.0326**	**0.1277**	**0.0000**	**73.5666**	**73.5666**	**0.0238**	**0.0000**	**74.1614**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.5000e-004	4.1400e-003	1.4200e-003	2.0000e-005	5.2000e-004	4.0000e-005	5.6000e-004	1.5000e-004	4.0000e-005	1.9000e-004	0.0000	1.6556	1.6556	9.0000e-005	2.4000e-004	1.7287
Worker	1.1900e-003	9.0000e-004	0.0124	4.0000e-005	4.0100e-003	2.0000e-005	4.0300e-003	1.0700e-003	2.0000e-005	1.0900e-003	0.0000	3.4137	3.4137	8.0000e-005	9.0000e-005	3.4414
Total	**1.3400e-003**	**5.0400e-003**	**0.0138**	**6.0000e-005**	**4.5300e-003**	**6.0000e-005**	**4.5900e-003**	**1.2200e-003**	**6.0000e-005**	**1.2800e-003**	**0.0000**	**5.0693**	**5.0693**	**1.7000e-004**	**3.3000e-004**	**5.1701**

3.5 Site Preparation Soil Haul - 2022

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	8.2000e-004	2.2000e-004	0.0000	9.0000e-005	1.0000e-005	9.0000e-005	2.0000e-005	1.0000e-005	3.0000e-005	0.0000	0.3067	0.3067	3.0000e-005	5.0000e-005	0.3221
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.0000e-005**	**8.2000e-004**	**2.2000e-004**	**0.0000**	**9.0000e-005**	**1.0000e-005**	**9.0000e-005**	**2.0000e-005**	**1.0000e-005**	**3.0000e-005**	**0.0000**	**0.3067**	**0.3067**	**3.0000e-005**	**5.0000e-005**	**0.3221**

Mitigated Construction On-Site

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-005	8.2000e-004	2.2000e-004	0.0000	8.0000e-005	1.0000e-005	9.0000e-005	2.0000e-005	1.0000e-005	3.0000e-005	0.0000	0.3067	0.3067	3.0000e-005	5.0000e-005	0.3221
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.0000e-005**	**8.2000e-004**	**2.2000e-004**	**0.0000**	**8.0000e-005**	**1.0000e-005**	**9.0000e-005**	**2.0000e-005**	**1.0000e-005**	**3.0000e-005**	**0.0000**	**0.3067**	**0.3067**	**3.0000e-005**	**5.0000e-005**	**0.3221**

3.6 Rough Grading - 2022

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0966	0.0000	0.0966	0.0384	0.0000	0.0384	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0381	0.4079	0.3049	6.5000e-004		0.0172	0.0172		0.0158	0.0158	0.0000	57.2613	57.2613	0.0185	0.0000	57.7243
Total	**0.0381**	**0.4079**	**0.3049**	**6.5000e-004**	**0.0966**	**0.0172**	**0.1138**	**0.0384**	**0.0158**	**0.0542**	**0.0000**	**57.2613**	**57.2613**	**0.0185**	**0.0000**	**57.7243**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	7.0000e-005	1.9700e-003	6.8000e-004	1.0000e-005	2.6000e-004	2.0000e-005	2.8000e-004	8.0000e-005	2.0000e-005	9.0000e-005	0.0000	0.7902	0.7902	5.0000e-005	1.1000e-004	0.8251
Worker	6.3000e-004	4.8000e-004	6.5700e-003	2.0000e-005	2.3100e-003	1.0000e-005	2.3200e-003	6.1000e-004	1.0000e-005	6.2000e-004	0.0000	1.8103	1.8103	5.0000e-005	5.0000e-005	1.8250
Total	**7.0000e-004**	**2.4500e-003**	**7.2500e-003**	**3.0000e-005**	**2.5700e-003**	**3.0000e-005**	**2.6000e-003**	**6.9000e-004**	**3.0000e-005**	**7.1000e-004**	**0.0000**	**2.6005**	**2.6005**	**1.0000e-004**	**1.6000e-004**	**2.6501**

Mitigated Construction On-Site

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0413	0.0000	0.0413	0.0164	0.0000	0.0164	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0381	0.4079	0.3049	6.5000e-004		0.0172	0.0172		0.0158	0.0158	0.0000	57.2613	57.2613	0.0185	0.0000	57.7243
Total	**0.0381**	**0.4079**	**0.3049**	**6.5000e-004**	**0.0413**	**0.0172**	**0.0585**	**0.0164**	**0.0158**	**0.0322**	**0.0000**	**57.2613**	**57.2613**	**0.0185**	**0.0000**	**57.7243**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	7.0000e-005	1.9700e-003	6.8000e-004	1.0000e-005	2.5000e-004	2.0000e-005	2.7000e-004	7.0000e-005	2.0000e-005	9.0000e-005	0.0000	0.7902	0.7902	5.0000e-005	1.1000e-004	0.8251
Worker	6.3000e-004	4.8000e-004	6.5700e-003	2.0000e-005	2.1300e-003	1.0000e-005	2.1400e-003	5.7000e-004	1.0000e-005	5.8000e-004	0.0000	1.8103	1.8103	5.0000e-005	5.0000e-005	1.8250
Total	**7.0000e-004**	**2.4500e-003**	**7.2500e-003**	**3.0000e-005**	**2.3800e-003**	**3.0000e-005**	**2.4100e-003**	**6.4000e-004**	**3.0000e-005**	**6.7000e-004**	**0.0000**	**2.6005**	**2.6005**	**1.0000e-004**	**1.6000e-004**	**2.6501**

3.7 Utility Trenching - 2022

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.1300e-003	0.0187	0.0342	5.0000e-005		9.0000e-004	9.0000e-004		8.3000e-004	8.3000e-004	0.0000	4.7629	4.7629	1.5400e-003	0.0000	4.8014
Total	**2.1300e-003**	**0.0187**	**0.0342**	**5.0000e-005**		**9.0000e-004**	**9.0000e-004**		**8.3000e-004**	**8.3000e-004**	**0.0000**	**4.7629**	**4.7629**	**1.5400e-003**	**0.0000**	**4.8014**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.0000e-005	7.0000e-005	9.9000e-004	0.0000	3.5000e-004	0.0000	3.5000e-004	9.0000e-005	0.0000	9.0000e-005	0.0000	0.2715	0.2715	1.0000e-005	1.0000e-005	0.2738
Total	**9.0000e-005**	**7.0000e-005**	**9.9000e-004**	**0.0000**	**3.5000e-004**	**0.0000**	**3.5000e-004**	**9.0000e-005**	**0.0000**	**9.0000e-005**	**0.0000**	**0.2715**	**0.2715**	**1.0000e-005**	**1.0000e-005**	**0.2738**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.1300e-003	0.0187	0.0342	5.0000e-005		9.0000e-004	9.0000e-004		8.3000e-004	8.3000e-004	0.0000	4.7629	4.7629	1.5400e-003	0.0000	4.8014
Total	**2.1300e-003**	**0.0187**	**0.0342**	**5.0000e-005**		**9.0000e-004**	**9.0000e-004**		**8.3000e-004**	**8.3000e-004**	**0.0000**	**4.7629**	**4.7629**	**1.5400e-003**	**0.0000**	**4.8014**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.0000e-005	7.0000e-005	9.9000e-004	0.0000	3.2000e-004	0.0000	3.2000e-004	9.0000e-005	0.0000	9.0000e-005	0.0000	0.2715	0.2715	1.0000e-005	1.0000e-005	0.2738
Total	**9.0000e-005**	**7.0000e-005**	**9.9000e-004**	**0.0000**	**3.2000e-004**	**0.0000**	**3.2000e-004**	**9.0000e-005**	**0.0000**	**9.0000e-005**	**0.0000**	**0.2715**	**0.2715**	**1.0000e-005**	**1.0000e-005**	**0.2738**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.8 Fine Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1058	0.0000	0.1058	0.0420	0.0000	0.0420	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0417	0.4467	0.3340	7.1000e-004		0.0188	0.0188		0.0173	0.0173	0.0000	62.7148	62.7148	0.0203	0.0000	63.2219
Total	**0.0417**	**0.4467**	**0.3340**	**7.1000e-004**	**0.1058**	**0.0188**	**0.1246**	**0.0420**	**0.0173**	**0.0593**	**0.0000**	**62.7148**	**62.7148**	**0.0203**	**0.0000**	**63.2219**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	8.0000e-005	2.1600e-003	7.4000e-004	1.0000e-005	2.9000e-004	2.0000e-005	3.1000e-004	8.0000e-005	2.0000e-005	1.0000e-004	0.0000	0.8654	0.8654	5.0000e-005	1.2000e-004	0.9037
Worker	6.9000e-004	5.2000e-004	7.1900e-003	2.0000e-005	2.5200e-003	1.0000e-005	2.5400e-003	6.7000e-004	1.0000e-005	6.8000e-004	0.0000	1.9827	1.9827	5.0000e-005	5.0000e-005	1.9988
Total	**7.7000e-004**	**2.6800e-003**	**7.9300e-003**	**3.0000e-005**	**2.8100e-003**	**3.0000e-005**	**2.8500e-003**	**7.5000e-004**	**3.0000e-005**	**7.8000e-004**	**0.0000**	**2.8481**	**2.8481**	**1.0000e-004**	**1.7000e-004**	**2.9025**

Mitigated Construction On-Site

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0453	0.0000	0.0453	0.0180	0.0000	0.0180	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0417	0.4467	0.3340	7.1000e-004		0.0188	0.0188		0.0173	0.0173	0.0000	62.7147	62.7147	0.0203	0.0000	63.2218
Total	**0.0417**	**0.4467**	**0.3340**	**7.1000e-004**	**0.0453**	**0.0188**	**0.0641**	**0.0180**	**0.0173**	**0.0353**	**0.0000**	**62.7147**	**62.7147**	**0.0203**	**0.0000**	**63.2218**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	8.0000e-005	2.1600e-003	7.4000e-004	1.0000e-005	2.7000e-004	2.0000e-005	2.9000e-004	8.0000e-005	2.0000e-005	1.0000e-004	0.0000	0.8654	0.8654	5.0000e-005	1.2000e-004	0.9037
Worker	6.9000e-004	5.2000e-004	7.1900e-003	2.0000e-005	2.3300e-003	1.0000e-005	2.3400e-003	6.2000e-004	1.0000e-005	6.3000e-004	0.0000	1.9827	1.9827	5.0000e-005	5.0000e-005	1.9988
Total	**7.7000e-004**	**2.6800e-003**	**7.9300e-003**	**3.0000e-005**	**2.6000e-003**	**3.0000e-005**	**2.6300e-003**	**7.0000e-004**	**3.0000e-005**	**7.3000e-004**	**0.0000**	**2.8481**	**2.8481**	**1.0000e-004**	**1.7000e-004**	**2.9025**

3.9 Asphalt Paving - 2022

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0121	0.1224	0.1604	2.5000e-004		6.2500e-003	6.2500e-003		5.7500e-003	5.7500e-003	0.0000	22.0303	22.0303	7.1300e-003	0.0000	22.2084
Paving	1.8300e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0140**	**0.1224**	**0.1604**	**2.5000e-004**		**6.2500e-003**	**6.2500e-003**		**5.7500e-003**	**5.7500e-003**	**0.0000**	**22.0303**	**22.0303**	**7.1300e-003**	**0.0000**	**22.2084**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.0000e-004	3.7000e-004	5.1600e-003	2.0000e-005	1.8100e-003	1.0000e-005	1.8200e-003	4.8000e-004	1.0000e-005	4.9000e-004	0.0000	1.4224	1.4224	4.0000e-005	4.0000e-005	1.4339
Total	**5.0000e-004**	**3.7000e-004**	**5.1600e-003**	**2.0000e-005**	**1.8100e-003**	**1.0000e-005**	**1.8200e-003**	**4.8000e-004**	**1.0000e-005**	**4.9000e-004**	**0.0000**	**1.4224**	**1.4224**	**4.0000e-005**	**4.0000e-005**	**1.4339**

Mitigated Construction On-Site

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0121	0.1224	0.1604	2.5000e-004		6.2500e-003	6.2500e-003		5.7500e-003	5.7500e-003	0.0000	22.0303	22.0303	7.1300e-003	0.0000	22.2084
Paving	1.8300e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0140**	**0.1224**	**0.1604**	**2.5000e-004**		**6.2500e-003**	**6.2500e-003**		**5.7500e-003**	**5.7500e-003**	**0.0000**	**22.0303**	**22.0303**	**7.1300e-003**	**0.0000**	**22.2084**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.0000e-004	3.7000e-004	5.1600e-003	2.0000e-005	1.6700e-003	1.0000e-005	1.6800e-003	4.5000e-004	1.0000e-005	4.6000e-004	0.0000	1.4224	1.4224	4.0000e-005	4.0000e-005	1.4339
Total	**5.0000e-004**	**3.7000e-004**	**5.1600e-003**	**2.0000e-005**	**1.6700e-003**	**1.0000e-005**	**1.6800e-003**	**4.5000e-004**	**1.0000e-005**	**4.6000e-004**	**0.0000**	**1.4224**	**1.4224**	**4.0000e-005**	**4.0000e-005**	**1.4339**

3.10 Finishing/Landscaping - 2022

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0111	0.0973	0.1783	2.8000e-004		4.7100e-003	4.7100e-003		4.3300e-003	4.3300e-003	0.0000	24.8452	24.8452	8.0400e-003	0.0000	25.0460
Total	**0.0111**	**0.0973**	**0.1783**	**2.8000e-004**		**4.7100e-003**	**4.7100e-003**		**4.3300e-003**	**4.3300e-003**	**0.0000**	**24.8452**	**24.8452**	**8.0400e-003**	**0.0000**	**25.0460**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	7.2800e-003	0.2075	0.0715	8.4000e-004	0.0278	1.9300e-003	0.0297	8.0200e-003	1.8500e-003	9.8700e-003	0.0000	83.0530	83.0530	4.7500e-003	0.0119	86.7214
Worker	0.0343	0.0258	0.3563	1.0700e-003	0.1250	6.9000e-004	0.1257	0.0332	6.3000e-004	0.0338	0.0000	98.1910	98.1910	2.4400e-003	2.4700e-003	98.9878
Total	**0.0416**	**0.2333**	**0.4278**	**1.9100e-003**	**0.1529**	**2.6200e-003**	**0.1555**	**0.0412**	**2.4800e-003**	**0.0437**	**0.0000**	**181.2440**	**181.2440**	**7.1900e-003**	**0.0144**	**185.7092**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0111	0.0973	0.1783	2.8000e-004		4.7100e-003	4.7100e-003		4.3300e-003	4.3300e-003	0.0000	24.8451	24.8451	8.0400e-003	0.0000	25.0460
Total	**0.0111**	**0.0973**	**0.1783**	**2.8000e-004**		**4.7100e-003**	**4.7100e-003**		**4.3300e-003**	**4.3300e-003**	**0.0000**	**24.8451**	**24.8451**	**8.0400e-003**	**0.0000**	**25.0460**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	7.2800e-003	0.2075	0.0715	8.4000e-004	0.0260	1.9300e-003	0.0280	7.5900e-003	1.8500e-003	9.4300e-003	0.0000	83.0530	83.0530	4.7500e-003	0.0119	86.7214
Worker	0.0343	0.0258	0.3563	1.0700e-003	0.1153	6.9000e-004	0.1160	0.0308	6.3000e-004	0.0314	0.0000	98.1910	98.1910	2.4400e-003	2.4700e-003	98.9878
Total	**0.0416**	**0.2333**	**0.4278**	**1.9100e-003**	**0.1413**	**2.6200e-003**	**0.1439**	**0.0384**	**2.4800e-003**	**0.0409**	**0.0000**	**181.2440**	**181.2440**	**7.1900e-003**	**0.0144**	**185.7092**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.10 Finishing/Landscaping - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.11 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0175					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.1000e-004	3.5200e-003	4.5300e-003	1.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	0.6383	0.6383	4.0000e-005	0.0000	0.6394
Total	**0.0180**	**3.5200e-003**	**4.5300e-003**	**1.0000e-005**		**2.0000e-004**	**2.0000e-004**		**2.0000e-004**	**2.0000e-004**	**0.0000**	**0.6383**	**0.6383**	**4.0000e-005**	**0.0000**	**0.6394**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.2000e-004	2.4000e-004	3.2800e-003	1.0000e-005	1.1500e-003	1.0000e-005	1.1600e-003	3.1000e-004	1.0000e-005	3.1000e-004	0.0000	0.9052	0.9052	2.0000e-005	2.0000e-005	0.9125
Total	**3.2000e-004**	**2.4000e-004**	**3.2800e-003**	**1.0000e-005**	**1.1500e-003**	**1.0000e-005**	**1.1600e-003**	**3.1000e-004**	**1.0000e-005**	**3.1000e-004**	**0.0000**	**0.9052**	**0.9052**	**2.0000e-005**	**2.0000e-005**	**0.9125**

Mitigated Construction On-Site

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0175					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	5.1000e-004	3.5200e-003	4.5300e-003	1.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	0.6383	0.6383	4.0000e-005	0.0000	0.6394
Total	**0.0180**	**3.5200e-003**	**4.5300e-003**	**1.0000e-005**		**2.0000e-004**	**2.0000e-004**		**2.0000e-004**	**2.0000e-004**	**0.0000**	**0.6383**	**0.6383**	**4.0000e-005**	**0.0000**	**0.6394**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.2000e-004	2.4000e-004	3.2800e-003	1.0000e-005	1.0600e-003	1.0000e-005	1.0700e-003	2.8000e-004	1.0000e-005	2.9000e-004	0.0000	0.9052	0.9052	2.0000e-005	2.0000e-005	0.9125
Total	**3.2000e-004**	**2.4000e-004**	**3.2800e-003**	**1.0000e-005**	**1.0600e-003**	**1.0000e-005**	**1.0700e-003**	**2.8000e-004**	**1.0000e-005**	**2.9000e-004**	**0.0000**	**0.9052**	**0.9052**	**2.0000e-005**	**2.0000e-005**	**0.9125**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Oak Creek Community Park Expansion & Improvement Plan

Orange County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
City Park	8.55	Acre	8.55	372,427.00	0
Parking Lot	0.51	Acre	0.51	22,401.00	0
Other Asphalt Surfaces	0.89	Acre	0.89	38,586.00	0
Other Non-Asphalt Surfaces	1.47	Acre	1.47	64,956.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2023
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	509.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Based on 2020 Sustainability Report.

Land Use - Based on Applicant info. (see assumptions file)

Construction Phase - Based on applicant info. (see assumptions file)

Off-road Equipment - No additional equipment for Asphalt Demolition Debris Haul

Off-road Equipment -

Off-road Equipment - No additional equipment required for Site Prep Soil Haul Phase

Off-road Equipment -

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Off-road Equipment - 1 Excavator based on equipment mix of projects of a similar size

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - 1 Excavator based on equipment mix of projects of a similar size

Off-road Equipment -

Grading -

Demolition -

Trips and VMT - Assume 4 vt/day/water trucks, See assumptions file

Construction Off-road Equipment Mitigation - SCAQMD Rule 403 and Rule 1186

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	CleanPavedRoadPercentReduction	0	9
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	20.00	23.00
tblConstructionPhase	NumDays	20.00	3.00
tblConstructionPhase	NumDays	10.00	44.00
tblConstructionPhase	NumDays	10.00	5.00
tblConstructionPhase	NumDays	30.00	21.00
tblConstructionPhase	NumDays	30.00	23.00
tblConstructionPhase	NumDays	20.00	22.00
tblConstructionPhase	NumDays	20.00	5.00
tblConstructionPhase	PhaseEndDate	6/28/2022	7/1/2022
tblGrading	MaterialImported	0.00	80.00
tblLandUse	LandUseSquareFeet	372,438.00	372,427.00
tblLandUse	LandUseSquareFeet	22,215.60	22,401.00
tblLandUse	LandUseSquareFeet	38,768.40	38,586.00
tblLandUse	LandUseSquareFeet	64,033.20	64,956.00
tblOffRoadEquipment	LoadFactor	0.38	0.38

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	390.98	509.98
tblTripsAndVMT	HaulingTripNumber	6.00	0.00
tblTripsAndVMT	HaulingTripNumber	0.00	7.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	81.00
tblTripsAndVMT	WorkerTripNumber	3.00	209.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	8.3029	74.4572	56.2663	0.1299	29.4067	3.3417	32.7484	13.9023	3.0746	16.9769	0.0000	12,886.8217	12,886.8217	3.3300	0.3066	13,052.6393
2023	0.8599	4.7716	10.8335	0.0395	2.8541	0.1027	2.9567	0.7686	0.0950	0.8636	0.0000	4,094.4721	4,094.4721	0.3014	0.2725	4,183.2220
Maximum	**8.3029**	**74.4572**	**56.2663**	**0.1299**	**29.4067**	**3.3417**	**32.7484**	**13.9023**	**3.0746**	**16.9769**	**0.0000**	**12,886.8217**	**12,886.8217**	**3.3300**	**0.3066**	**13,052.6393**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	8.3029	74.4572	56.2663	0.1299	12.8415	3.3417	16.1832	6.0165	3.0746	9.0911	0.0000	12,886.8217	12,886.8217	3.3300	0.3066	13,052.6393
2023	0.8599	4.7716	10.8335	0.0395	2.6380	0.1027	2.7407	0.7156	0.0950	0.8106	0.0000	4,094.4721	4,094.4721	0.3014	0.2725	4,183.2220
Maximum	**8.3029**	**74.4572**	**56.2663**	**0.1299**	**12.8415**	**3.3417**	**16.1832**	**6.0165**	**3.0746**	**9.0911**	**0.0000**	**12,886.8217**	**12,886.8217**	**3.3300**	**0.3066**	**13,052.6393**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**52.02**	**0.00**	**47.00**	**54.11**	**0.00**	**44.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0735	1.0000e-005	1.1700e-003	0.0000		0.0000	0.0000		0.0000	0.0000		2.5000e-003	2.5000e-003	1.0000e-005		2.6600e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0483	0.0476	0.4661	1.0700e-003	0.1135	7.3000e-004	0.1143	0.0303	6.8000e-004	0.0309		109.3873	109.3873	6.6100e-003	4.4100e-003	110.8670
Total	**0.1218**	**0.0476**	**0.4672**	**1.0700e-003**	**0.1135**	**7.3000e-004**	**0.1143**	**0.0303**	**6.8000e-004**	**0.0309**		**109.3898**	**109.3898**	**6.6200e-003**	**4.4100e-003**	**110.8697**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0735	1.0000e-005	1.1700e-003	0.0000		0.0000	0.0000		0.0000	0.0000		2.5000e-003	2.5000e-003	1.0000e-005		2.6600e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0483	0.0476	0.4661	1.0700e-003	0.1135	7.3000e-004	0.1143	0.0303	6.8000e-004	0.0309		109.3873	109.3873	6.6100e-003	4.4100e-003	110.8670
Total	**0.1218**	**0.0476**	**0.4672**	**1.0700e-003**	**0.1135**	**7.3000e-004**	**0.1143**	**0.0303**	**6.8000e-004**	**0.0309**		**109.3898**	**109.3898**	**6.6200e-003**	**4.4100e-003**	**110.8697**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Asphalt Demolition	Demolition	6/1/2022	7/1/2022	5	23	a
2	Asphalt Demolition Debris Haul	Demolition	6/29/2022	7/1/2022	5	3	b
3	Site Preparation	Site Preparation	6/1/2022	8/1/2022	5	44	c
4	Site Preparation Soil Haul	Site Preparation	7/26/2022	8/1/2022	5	5	d
5	Rough Grading	Grading	7/2/2022	8/1/2022	5	21	e
6	Utility Trenching	Trenching	7/2/2022	8/1/2022	5	21	f
7	Fine Grading	Grading	8/2/2022	9/1/2022	5	23	g
8	Asphalt Paving	Paving	9/1/2022	10/1/2022	5	22	h
9	Finishing/Landscaping	Trenching	8/2/2022	1/1/2023	5	109	i
10	Architectural Coating	Architectural Coating	11/1/2022	11/7/2022	5	5	j

Acres of Grading (Site Preparation Phase): 66

Acres of Grading (Grading Phase): 63

Acres of Paving: 2.87

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 7,557 (Architectural Coating

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Asphalt Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Asphalt Demolition Debris Haul	Concrete/Industrial Saws	0	8.00	81	0.73
Asphalt Demolition	Excavators	3	8.00	158	0.38
Asphalt Demolition Debris Haul	Excavators	0	8.00	158	0.38

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Rough Grading	Excavators	2	8.00	158	0.38
Fine Grading	Excavators	2	8.00	158	0.38
Rough Grading	Graders	1	8.00	187	0.41
Fine Grading	Graders	1	8.00	187	0.41
Asphalt Paving	Pavers	2	8.00	130	0.42
Asphalt Paving	Paving Equipment	2	8.00	132	0.36
Asphalt Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Asphalt Paving	Rollers	2	8.00	80	0.38
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Asphalt Demolition Debris Haul	Rubber Tired Dozers	0	8.00	247	0.40
Rough Grading	Rubber Tired Dozers	1	8.00	247	0.40
Fine Grading	Rubber Tired Dozers	1	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Preparation Soil Haul	Rubber Tired Dozers	0	8.00	247	0.40
Rough Grading	Scrapers	2	8.00	367	0.48
Fine Grading	Scrapers	2	8.00	367	0.48
Rough Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Fine Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Site Preparation Soil Haul	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Utility Trenching	Excavators	1	8.00	158	0.38
Finishing/Landscaping	Excavators	1	8.00	158	0.38

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Asphalt Demolition	6	15.00	4.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	4.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Asphalt Demolition Debris Haul	0	0.00	0.00	7.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation Soil Haul	0	0.00	0.00	10.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Rough Grading	8	20.00	4.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	42.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Utility Trenching	1	3.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Fine Grading	8	20.00	4.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Asphalt Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Finishing/Landscaping	1	209.00	81.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.2 Asphalt Demolition - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0568	0.0000	0.0568	8.5900e-003	0.0000	8.5900e-003			0.0000			0.0000
Off-Road	2.6392	25.7194	20.5941	0.0388		1.2427	1.2427		1.1553	1.1553		3,746.7812	3,746.7812	1.0524		3,773.0920
Total	**2.6392**	**25.7194**	**20.5941**	**0.0388**	**0.0568**	**1.2427**	**1.2994**	**8.5900e-003**	**1.1553**	**1.1639**		**3,746.7812**	**3,746.7812**	**1.0524**		**3,773.0920**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.6500e-003	0.1795	0.0637	7.6000e-004	0.0256	1.7500e-003	0.0273	7.3600e-003	1.6700e-003	9.0300e-003		82.9430	82.9430	4.7500e-003	0.0119	86.6040
Worker	0.0451	0.0303	0.4930	1.4600e-003	0.1677	9.0000e-004	0.1686	0.0445	8.3000e-004	0.0453		147.7067	147.7067	3.4700e-003	3.3200e-003	148.7828
Total	**0.0518**	**0.2098**	**0.5567**	**2.2200e-003**	**0.1932**	**2.6500e-003**	**0.1959**	**0.0518**	**2.5000e-003**	**0.0543**		**230.6498**	**230.6498**	**8.2200e-003**	**0.0152**	**235.3868**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0243	0.0000	0.0243	3.6700e-003	0.0000	3.6700e-003			0.0000			0.0000
Off-Road	2.6392	25.7194	20.5941	0.0388		1.2427	1.2427		1.1553	1.1553	0.0000	3,746.7812	3,746.7812	1.0524		3,773.0920
Total	**2.6392**	**25.7194**	**20.5941**	**0.0388**	**0.0243**	**1.2427**	**1.2669**	**3.6700e-003**	**1.1553**	**1.1589**	**0.0000**	**3,746.7812**	**3,746.7812**	**1.0524**		**3,773.0920**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.6500e-003	0.1795	0.0637	7.6000e-004	0.0239	1.7500e-003	0.0257	6.9600e-003	1.6700e-003	8.6300e-003		82.9430	82.9430	4.7500e-003	0.0119	86.6040
Worker	0.0451	0.0303	0.4930	1.4600e-003	0.1546	9.0000e-004	0.1555	0.0413	8.3000e-004	0.0421		147.7067	147.7067	3.4700e-003	3.3200e-003	148.7828
Total	**0.0518**	**0.2098**	**0.5567**	**2.2200e-003**	**0.1785**	**2.6500e-003**	**0.1811**	**0.0482**	**2.5000e-003**	**0.0507**		**230.6498**	**230.6498**	**8.2200e-003**	**0.0152**	**235.3868**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.3 Asphalt Demolition Debris Haul - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	9.4500e-003	0.3633	0.1020	1.3900e-003	0.0407	2.7500e-003	0.0434	0.0111	2.6300e-003	0.0138		157.7558	157.7558	0.0150	0.0253	165.6613
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total	**9.4500e-003**	**0.3633**	**0.1020**	**1.3900e-003**	**0.0407**	**2.7500e-003**	**0.0434**	**0.0111**	**2.6300e-003**	**0.0138**		**157.7558**	**157.7558**	**0.0150**	**0.0253**	**165.6613**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	9.4500e-003	0.3633	0.1020	1.3900e-003	0.0379	2.7500e-003	0.0407	0.0105	2.6300e-003	0.0131		157.7558	157.7558	0.0150	0.0253	165.6613
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total	**9.4500e-003**	**0.3633**	**0.1020**	**1.3900e-003**	**0.0379**	**2.7500e-003**	**0.0407**	**0.0105**	**2.6300e-003**	**0.0131**		**157.7558**	**157.7558**	**0.0150**	**0.0253**	**165.6613**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.4 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					19.6570	0.0000	19.6570	10.1025	0.0000	10.1025			0.0000			0.0000
Off-Road	3.1701	33.0835	19.6978	0.0380		1.6126	1.6126		1.4836	1.4836		3,686.0619	3,686.0619	1.1922		3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**	**0.0380**	**19.6570**	**1.6126**	**21.2696**	**10.1025**	**1.4836**	**11.5860**		**3,686.0619**	**3,686.0619**	**1.1922**		**3,715.8655**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.6500e-003	0.1795	0.0637	7.6000e-004	0.0256	1.7500e-003	0.0273	7.3600e-003	1.6700e-003	9.0300e-003		82.9430	82.9430	4.7500e-003	0.0119	86.6040
Worker	0.0541	0.0364	0.5915	1.7500e-003	0.2012	1.0800e-003	0.2023	0.0534	1.0000e-003	0.0544		177.2481	177.2481	4.1700e-003	3.9800e-003	178.5393
Total	**0.0608**	**0.2159**	**0.6553**	**2.5100e-003**	**0.2268**	**2.8300e-003**	**0.2296**	**0.0607**	**2.6700e-003**	**0.0634**		**260.1911**	**260.1911**	**8.9200e-003**	**0.0159**	**265.1433**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.4034	0.0000	8.4034	4.3188	0.0000	4.3188			0.0000			0.0000
Off-Road	3.1701	33.0835	19.6978	0.0380		1.6126	1.6126		1.4836	1.4836	0.0000	3,686.0619	3,686.0619	1.1922		3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**	**0.0380**	**8.4034**	**1.6126**	**10.0159**	**4.3188**	**1.4836**	**5.8024**	**0.0000**	**3,686.0619**	**3,686.0619**	**1.1922**		**3,715.8655**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.6500e-003	0.1795	0.0637	7.6000e-004	0.0239	1.7500e-003	0.0257	6.9600e-003	1.6700e-003	8.6300e-003		82.9430	82.9430	4.7500e-003	0.0119	86.6040
Worker	0.0541	0.0364	0.5915	1.7500e-003	0.1855	1.0800e-003	0.1865	0.0495	1.0000e-003	0.0505		177.2481	177.2481	4.1700e-003	3.9800e-003	178.5393
Total	**0.0608**	**0.2159**	**0.6553**	**2.5100e-003**	**0.2094**	**2.8300e-003**	**0.2122**	**0.0565**	**2.6700e-003**	**0.0591**		**260.1911**	**260.1911**	**8.9200e-003**	**0.0159**	**265.1433**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.5 Site Preparation Soil Haul - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.8100e-003	0.0000	1.8100e-003	2.7000e-004	0.0000	2.7000e-004			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.8100e-003**	**0.0000**	**1.8100e-003**	**2.7000e-004**	**0.0000**	**2.7000e-004**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	8.1000e-003	0.3114	0.0875	1.1900e-003	0.0349	2.3600e-003	0.0372	9.5500e-003	2.2500e-003	0.0118		135.2193	135.2193	0.0129	0.0217	141.9954
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total	**8.1000e-003**	**0.3114**	**0.0875**	**1.1900e-003**	**0.0349**	**2.3600e-003**	**0.0372**	**9.5500e-003**	**2.2500e-003**	**0.0118**		**135.2193**	**135.2193**	**0.0129**	**0.0217**	**141.9954**

Mitigated Construction On-Site

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					7.7000e-004	0.0000	7.7000e-004	1.2000e-004	0.0000	1.2000e-004			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**7.7000e-004**	**0.0000**	**7.7000e-004**	**1.2000e-004**	**0.0000**	**1.2000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	8.1000e-003	0.3114	0.0875	1.1900e-003	0.0325	2.3600e-003	0.0349	8.9700e-003	2.2500e-003	0.0112		135.2193	135.2193	0.0129	0.0217	141.9954
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total	**8.1000e-003**	**0.3114**	**0.0875**	**1.1900e-003**	**0.0325**	**2.3600e-003**	**0.0349**	**8.9700e-003**	**2.2500e-003**	**0.0112**		**135.2193**	**135.2193**	**0.0129**	**0.0217**	**141.9954**

3.6 Rough Grading - 2022

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					9.2036	0.0000	9.2036	3.6538	0.0000	3.6538			0.0000			0.0000
Off-Road	3.6248	38.8435	29.0415	0.0621		1.6349	1.6349		1.5041	1.5041		6,011.4105	6,011.4105	1.9442		6,060.0158
Total	**3.6248**	**38.8435**	**29.0415**	**0.0621**	**9.2036**	**1.6349**	**10.8385**	**3.6538**	**1.5041**	**5.1579**		**6,011.4105**	**6,011.4105**	**1.9442**		**6,060.0158**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.6500e-003	0.1795	0.0637	7.6000e-004	0.0256	1.7500e-003	0.0273	7.3600e-003	1.6700e-003	9.0300e-003		82.9430	82.9430	4.7500e-003	0.0119	86.6040
Worker	0.0602	0.0404	0.6573	1.9500e-003	0.2236	1.2000e-003	0.2248	0.0593	1.1100e-003	0.0604		196.9423	196.9423	4.6300e-003	4.4300e-003	198.3770
Total	**0.0668**	**0.2199**	**0.7210**	**2.7100e-003**	**0.2491**	**2.9500e-003**	**0.2521**	**0.0667**	**2.7800e-003**	**0.0694**		**279.8853**	**279.8853**	**9.3800e-003**	**0.0163**	**284.9810**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.9345	0.0000	3.9345	1.5620	0.0000	1.5620			0.0000			0.0000
Off-Road	3.6248	38.8435	29.0415	0.0621		1.6349	1.6349		1.5041	1.5041	0.0000	6,011.4105	6,011.4105	1.9442		6,060.0158
Total	**3.6248**	**38.8435**	**29.0415**	**0.0621**	**3.9345**	**1.6349**	**5.5694**	**1.5620**	**1.5041**	**3.0661**	**0.0000**	**6,011.4105**	**6,011.4105**	**1.9442**		**6,060.0158**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.6500e-003	0.1795	0.0637	7.6000e-004	0.0239	1.7500e-003	0.0257	6.9600e-003	1.6700e-003	8.6300e-003		82.9430	82.9430	4.7500e-003	0.0119	86.6040
Worker	0.0602	0.0404	0.6573	1.9500e-003	0.2061	1.2000e-003	0.2073	0.0550	1.1100e-003	0.0561		196.9423	196.9423	4.6300e-003	4.4300e-003	198.3770
Total	**0.0668**	**0.2199**	**0.7210**	**2.7100e-003**	**0.2300**	**2.9500e-003**	**0.2330**	**0.0620**	**2.7800e-003**	**0.0647**		**279.8853**	**279.8853**	**9.3800e-003**	**0.0163**	**284.9810**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.7 Utility Trenching - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2024	1.7770	3.2551	5.1700e-003		0.0859	0.0859		0.0790	0.0790		500.0153	500.0153	0.1617		504.0582
Total	**0.2024**	**1.7770**	**3.2551**	**5.1700e-003**		**0.0859**	**0.0859**		**0.0790**	**0.0790**		**500.0153**	**500.0153**	**0.1617**		**504.0582**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.0200e-003	6.0600e-003	0.0986	2.9000e-004	0.0335	1.8000e-004	0.0337	8.8900e-003	1.7000e-004	9.0600e-003		29.5414	29.5414	6.9000e-004	6.6000e-004	29.7566
Total	**9.0200e-003**	**6.0600e-003**	**0.0986**	**2.9000e-004**	**0.0335**	**1.8000e-004**	**0.0337**	**8.8900e-003**	**1.7000e-004**	**9.0600e-003**		**29.5414**	**29.5414**	**6.9000e-004**	**6.6000e-004**	**29.7566**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2024	1.7770	3.2551	5.1700e-003		0.0859	0.0859		0.0790	0.0790	0.0000	500.0153	500.0153	0.1617		504.0582
Total	**0.2024**	**1.7770**	**3.2551**	**5.1700e-003**		**0.0859**	**0.0859**		**0.0790**	**0.0790**	**0.0000**	**500.0153**	**500.0153**	**0.1617**		**504.0582**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.0200e-003	6.0600e-003	0.0986	2.9000e-004	0.0309	1.8000e-004	0.0311	8.2500e-003	1.7000e-004	8.4200e-003		29.5414	29.5414	6.9000e-004	6.6000e-004	29.7566
Total	**9.0200e-003**	**6.0600e-003**	**0.0986**	**2.9000e-004**	**0.0309**	**1.8000e-004**	**0.0311**	**8.2500e-003**	**1.7000e-004**	**8.4200e-003**		**29.5414**	**29.5414**	**6.9000e-004**	**6.6000e-004**	**29.7566**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.8 Fine Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					9.2036	0.0000	9.2036	3.6538	0.0000	3.6538			0.0000			0.0000
Off-Road	3.6248	38.8435	29.0415	0.0621		1.6349	1.6349		1.5041	1.5041		6,011.4105	6,011.4105	1.9442		6,060.0158
Total	**3.6248**	**38.8435**	**29.0415**	**0.0621**	**9.2036**	**1.6349**	**10.8385**	**3.6538**	**1.5041**	**5.1579**		**6,011.4105**	**6,011.4105**	**1.9442**		**6,060.0158**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.6500e-003	0.1795	0.0637	7.6000e-004	0.0256	1.7500e-003	0.0273	7.3600e-003	1.6700e-003	9.0300e-003		82.9430	82.9430	4.7500e-003	0.0119	86.6040
Worker	0.0602	0.0404	0.6573	1.9500e-003	0.2236	1.2000e-003	0.2248	0.0593	1.1100e-003	0.0604		196.9423	196.9423	4.6300e-003	4.4300e-003	198.3770
Total	**0.0668**	**0.2199**	**0.7210**	**2.7100e-003**	**0.2491**	**2.9500e-003**	**0.2521**	**0.0667**	**2.7800e-003**	**0.0694**		**279.8853**	**279.8853**	**9.3800e-003**	**0.0163**	**284.9810**

Mitigated Construction On-Site

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.9345	0.0000	3.9345	1.5620	0.0000	1.5620			0.0000			0.0000
Off-Road	3.6248	38.8435	29.0415	0.0621		1.6349	1.6349		1.5041	1.5041	0.0000	6,011.4105	6,011.4105	1.9442		6,060.0158
Total	**3.6248**	**38.8435**	**29.0415**	**0.0621**	**3.9345**	**1.6349**	**5.5694**	**1.5620**	**1.5041**	**3.0661**	**0.0000**	**6,011.4105**	**6,011.4105**	**1.9442**		**6,060.0158**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.6500e-003	0.1795	0.0637	7.6000e-004	0.0239	1.7500e-003	0.0257	6.9600e-003	1.6700e-003	8.6300e-003		82.9430	82.9430	4.7500e-003	0.0119	86.6040
Worker	0.0602	0.0404	0.6573	1.9500e-003	0.2061	1.2000e-003	0.2073	0.0550	1.1100e-003	0.0561		196.9423	196.9423	4.6300e-003	4.4300e-003	198.3770
Total	**0.0668**	**0.2199**	**0.7210**	**2.7100e-003**	**0.2300**	**2.9500e-003**	**0.2330**	**0.0620**	**2.7800e-003**	**0.0647**		**279.8853**	**279.8853**	**9.3800e-003**	**0.0163**	**284.9810**

3.9 Asphalt Paving - 2022

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225		2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.1667					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.2696**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**		**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0451	0.0303	0.4930	1.4600e-003	0.1677	9.0000e-004	0.1686	0.0445	8.3000e-004	0.0453		147.7067	147.7067	3.4700e-003	3.3200e-003	148.7828
Total	**0.0451**	**0.0303**	**0.4930**	**1.4600e-003**	**0.1677**	**9.0000e-004**	**0.1686**	**0.0445**	**8.3000e-004**	**0.0453**		**147.7067**	**147.7067**	**3.4700e-003**	**3.3200e-003**	**148.7828**

Mitigated Construction On-Site

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225	0.0000	2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.1667					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.2696**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**	**0.0000**	**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0451	0.0303	0.4930	1.4600e-003	0.1546	9.0000e-004	0.1555	0.0413	8.3000e-004	0.0421		147.7067	147.7067	3.4700e-003	3.3200e-003	148.7828
Total	**0.0451**	**0.0303**	**0.4930**	**1.4600e-003**	**0.1546**	**9.0000e-004**	**0.1555**	**0.0413**	**8.3000e-004**	**0.0421**		**147.7067**	**147.7067**	**3.4700e-003**	**3.3200e-003**	**148.7828**

3.10 Finishing/Landscaping - 2022

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2034	1.7859	3.2714	5.1900e-003		0.0864	0.0864		0.0794	0.0794		502.5154	502.5154	0.1625		506.5784
Total	**0.2034**	**1.7859**	**3.2714**	**5.1900e-003**		**0.0864**	**0.0864**		**0.0794**	**0.0794**		**502.5154**	**502.5154**	**0.1625**		**506.5784**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1347	3.6345	1.2905	0.0153	0.5179	0.0354	0.5533	0.1491	0.0338	0.1829		1,679.5964	1,679.5964	0.0962	0.2407	1,753.7313
Worker	0.6286	0.4224	6.8684	0.0204	2.3361	0.0126	2.3487	0.6196	0.0116	0.6311		2,058.0471	2,058.0471	0.0484	0.0463	2,073.0397
Total	**0.7633**	**4.0568**	**8.1589**	**0.0357**	**2.8541**	**0.0479**	**2.9020**	**0.7686**	**0.0454**	**0.8140**		**3,737.6435**	**3,737.6435**	**0.1447**	**0.2870**	**3,826.7709**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2034	1.7859	3.2714	5.1900e-003		0.0864	0.0864		0.0794	0.0794	0.0000	502.5154	502.5154	0.1625		506.5784
Total	**0.2034**	**1.7859**	**3.2714**	**5.1900e-003**		**0.0864**	**0.0864**		**0.0794**	**0.0794**	**0.0000**	**502.5154**	**502.5154**	**0.1625**		**506.5784**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1347	3.6345	1.2905	0.0153	0.4847	0.0354	0.5200	0.1409	0.0338	0.1747		1,679.5964	1,679.5964	0.0962	0.2407	1,753.7313
Worker	0.6286	0.4224	6.8684	0.0204	2.1533	0.0126	2.1659	0.5747	0.0116	0.5863		2,058.0471	2,058.0471	0.0484	0.0463	2,073.0397
Total	**0.7633**	**4.0568**	**8.1589**	**0.0357**	**2.6380**	**0.0479**	**2.6860**	**0.7156**	**0.0454**	**0.7610**		**3,737.6435**	**3,737.6435**	**0.1447**	**0.2870**	**3,826.7709**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.10 Finishing/Landscaping - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.1896	1.5564	3.2741	5.1900e-003		0.0762	0.0762		0.0701	0.0701		502.6062	502.6062	0.1626		506.6700
Total	**0.1896**	**1.5564**	**3.2741**	**5.1900e-003**		**0.0762**	**0.0762**		**0.0701**	**0.0701**		**502.6062**	**502.6062**	**0.1626**		**506.6700**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0818	2.8387	1.1770	0.0146	0.5179	0.0146	0.5325	0.1491	0.0139	0.1630		1,599.3400	1,599.3400	0.0951	0.2295	1,670.1038
Worker	0.5885	0.3765	6.3824	0.0197	2.3361	0.0119	2.3480	0.6196	0.0110	0.6305		1,992.5259	1,992.5259	0.0438	0.0431	2,006.4482
Total	**0.6703**	**3.2152**	**7.5594**	**0.0343**	**2.8541**	**0.0265**	**2.8805**	**0.7686**	**0.0249**	**0.7935**		**3,591.8659**	**3,591.8659**	**0.1389**	**0.2725**	**3,676.5520**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.1896	1.5564	3.2741	5.1900e-003		0.0762	0.0762		0.0701	0.0701	0.0000	502.6062	502.6062	0.1626		506.6700
Total	**0.1896**	**1.5564**	**3.2741**	**5.1900e-003**		**0.0762**	**0.0762**		**0.0701**	**0.0701**	**0.0000**	**502.6062**	**502.6062**	**0.1626**		**506.6700**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0818	2.8387	1.1770	0.0146	0.4847	0.0146	0.4992	0.1409	0.0139	0.1548		1,599.3400	1,599.3400	0.0951	0.2295	1,670.1038
Worker	0.5885	0.3765	6.3824	0.0197	2.1533	0.0119	2.1653	0.5747	0.0110	0.5857		1,992.5259	1,992.5259	0.0438	0.0431	2,006.4482
Total	**0.6703**	**3.2152**	**7.5594**	**0.0343**	**2.6380**	**0.0265**	**2.6645**	**0.7156**	**0.0249**	**0.7405**		**3,591.8659**	**3,591.8659**	**0.1389**	**0.2725**	**3,676.5520**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.11 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	7.0053					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817		281.4481	281.4481	0.0183		281.9062
Total	**7.2099**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**		**281.4481**	**281.4481**	**0.0183**		**281.9062**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.1263	0.0849	1.3803	4.0900e-003	0.4695	2.5300e-003	0.4720	0.1245	2.3300e-003	0.1268		413.5788	413.5788	9.7300e-003	9.2900e-003	416.5917
Total	**0.1263**	**0.0849**	**1.3803**	**4.0900e-003**	**0.4695**	**2.5300e-003**	**0.4720**	**0.1245**	**2.3300e-003**	**0.1268**		**413.5788**	**413.5788**	**9.7300e-003**	**9.2900e-003**	**416.5917**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	7.0053					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817	0.0000	281.4481	281.4481	0.0183		281.9062
Total	**7.2099**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**	**0.0000**	**281.4481**	**281.4481**	**0.0183**		**281.9062**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.1263	0.0849	1.3803	4.0900e-003	0.4327	2.5300e-003	0.4353	0.1155	2.3300e-003	0.1178		413.5788	413.5788	9.7300e-003	9.2900e-003	416.5917
Total	**0.1263**	**0.0849**	**1.3803**	**4.0900e-003**	**0.4327**	**2.5300e-003**	**0.4353**	**0.1155**	**2.3300e-003**	**0.1178**		**413.5788**	**413.5788**	**9.7300e-003**	**9.2900e-003**	**416.5917**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Oak Creek Community Park Expansion & Improvement Plan

Orange County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
City Park	8.55	Acre	8.55	372,427.00	0
Parking Lot	0.51	Acre	0.51	22,401.00	0
Other Asphalt Surfaces	0.89	Acre	0.89	38,586.00	0
Other Non-Asphalt Surfaces	1.47	Acre	1.47	64,956.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2023
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	509.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Based on 2020 Sustainability Report.

Land Use - Based on Applicant info. (see assumptions file)

Construction Phase - Based on applicant info. (see assumptions file)

Off-road Equipment - No additional equipment for Asphalt Demolition Debris Haul

Off-road Equipment -

Off-road Equipment - No additional equipment required for Site Prep Soil Haul Phase

Off-road Equipment -

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Off-road Equipment - 1 Excavator based on equipment mix of projects of a similar size

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - 1 Excavator based on equipment mix of projects of a similar size

Off-road Equipment -

Grading -

Demolition -

Trips and VMT - Assume 4 vt/day/water trucks, See assumptions file

Construction Off-road Equipment Mitigation - SCAQMD Rule 403 and Rule 1186

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	CleanPavedRoadPercentReduction	0	9
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	20.00	23.00
tblConstructionPhase	NumDays	20.00	3.00
tblConstructionPhase	NumDays	10.00	44.00
tblConstructionPhase	NumDays	10.00	5.00
tblConstructionPhase	NumDays	30.00	21.00
tblConstructionPhase	NumDays	30.00	23.00
tblConstructionPhase	NumDays	20.00	22.00
tblConstructionPhase	NumDays	20.00	5.00
tblConstructionPhase	PhaseEndDate	6/28/2022	7/1/2022
tblGrading	MaterialImported	0.00	80.00
tblLandUse	LandUseSquareFeet	372,438.00	372,427.00
tblLandUse	LandUseSquareFeet	22,215.60	22,401.00
tblLandUse	LandUseSquareFeet	38,768.40	38,586.00
tblLandUse	LandUseSquareFeet	64,033.20	64,956.00
tblOffRoadEquipment	LoadFactor	0.38	0.38

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	390.98	509.98
tblTripsAndVMT	HaulingTripNumber	6.00	0.00
tblTripsAndVMT	HaulingTripNumber	0.00	7.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	VendorTripNumber	0.00	81.00
tblTripsAndVMT	WorkerTripNumber	3.00	209.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	8.3684	74.4916	55.7580	0.1288	29.4067	3.3417	32.7484	13.9023	3.0746	16.9769	0.0000	12,772.1809	12,772.1809	3.3302	0.3103	12,939.1365
2023	0.9118	4.9351	10.4342	0.0385	2.8541	0.1028	2.9568	0.7686	0.0951	0.8637	0.0000	4,001.5626	4,001.5626	0.3023	0.2758	4,091.3080
Maximum	**8.3684**	**74.4916**	**55.7580**	**0.1288**	**29.4067**	**3.3417**	**32.7484**	**13.9023**	**3.0746**	**16.9769**	**0.0000**	**12,772.1809**	**12,772.1809**	**3.3302**	**0.3103**	**12,939.1365**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	8.3684	74.4916	55.7580	0.1288	12.8415	3.3417	16.1832	6.0165	3.0746	9.0911	0.0000	12,772.1809	12,772.1809	3.3302	0.3103	12,939.1365
2023	0.9118	4.9351	10.4342	0.0385	2.6380	0.1028	2.7408	0.7156	0.0951	0.8107	0.0000	4,001.5626	4,001.5626	0.3023	0.2758	4,091.3080
Maximum	**8.3684**	**74.4916**	**55.7580**	**0.1288**	**12.8415**	**3.3417**	**16.1832**	**6.0165**	**3.0746**	**9.0911**	**0.0000**	**12,772.1809**	**12,772.1809**	**3.3302**	**0.3103**	**12,939.1365**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**52.02**	**0.00**	**47.00**	**54.11**	**0.00**	**44.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Asphalt Demolition	Demolition	6/1/2022	7/1/2022	5	23	a
2	Asphalt Demolition Debris Haul	Demolition	6/29/2022	7/1/2022	5	3	b
3	Site Preparation	Site Preparation	6/1/2022	8/1/2022	5	44	c
4	Site Preparation Soil Haul	Site Preparation	7/26/2022	8/1/2022	5	5	d
5	Rough Grading	Grading	7/2/2022	8/1/2022	5	21	e
6	Utility Trenching	Trenching	7/2/2022	8/1/2022	5	21	f
7	Fine Grading	Grading	8/2/2022	9/1/2022	5	23	g
8	Asphalt Paving	Paving	9/1/2022	10/1/2022	5	22	h
9	Finishing/Landscaping	Trenching	8/2/2022	1/1/2023	5	109	i
10	Architectural Coating	Architectural Coating	11/1/2022	11/7/2022	5	5	j

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Acres of Grading (Site Preparation Phase): 66

Acres of Grading (Grading Phase): 63

Acres of Paving: 2.87

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 7,557 (Architectural Coating

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Asphalt Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Asphalt Demolition Debris Haul	Concrete/Industrial Saws	0	8.00	81	0.73
Asphalt Demolition	Excavators	3	8.00	158	0.38
Asphalt Demolition Debris Haul	Excavators	0	8.00	158	0.38
Rough Grading	Excavators	2	8.00	158	0.38
Fine Grading	Excavators	2	8.00	158	0.38
Rough Grading	Graders	1	8.00	187	0.41
Fine Grading	Graders	1	8.00	187	0.41
Asphalt Paving	Pavers	2	8.00	130	0.42
Asphalt Paving	Paving Equipment	2	8.00	132	0.36
Asphalt Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Asphalt Paving	Rollers	2	8.00	80	0.38
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Asphalt Demolition Debris Haul	Rubber Tired Dozers	0	8.00	247	0.40
Rough Grading	Rubber Tired Dozers	1	8.00	247	0.40
Fine Grading	Rubber Tired Dozers	1	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Site Preparation Soil Haul	Rubber Tired Dozers	0	8.00	247	0.40
Rough Grading	Scrapers	2	8.00	367	0.48

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Fine Grading	Scrapers	2	8.00	367	0.48
Rough Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Fine Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Site Preparation Soil Haul	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Utility Trenching	Excavators	1	8.00	158	0.38
Finishing/Landscaping	Excavators	1	8.00	158	0.38

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Asphalt Demolition	6	15.00	4.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	4.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Asphalt Demolition Debris Haul	0	0.00	0.00	7.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation Soil Haul	0	0.00	0.00	10.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Rough Grading	8	20.00	4.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	42.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Utility Trenching	1	3.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Fine Grading	8	20.00	4.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Asphalt Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Finishing/Landscaping	1	209.00	81.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.2 Asphalt Demolition - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0568	0.0000	0.0568	8.5900e-003	0.0000	8.5900e-003			0.0000			0.0000
Off-Road	2.6392	25.7194	20.5941	0.0388		1.2427	1.2427		1.1553	1.1553		3,746.7812	3,746.7812	1.0524		3,773.0920
Total	**2.6392**	**25.7194**	**20.5941**	**0.0388**	**0.0568**	**1.2427**	**1.2994**	**8.5900e-003**	**1.1553**	**1.1639**		**3,746.7812**	**3,746.7812**	**1.0524**		**3,773.0920**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.5600e-003	0.1865	0.0660	7.6000e-004	0.0256	1.7500e-003	0.0273	7.3600e-003	1.6800e-003	9.0400e-003		82.9691	82.9691	4.7400e-003	0.0119	86.6334
Worker	0.0491	0.0333	0.4587	1.3900e-003	0.1677	9.0000e-004	0.1686	0.0445	8.3000e-004	0.0453		140.6252	140.6252	3.5500e-003	3.5300e-003	141.7667
Total	**0.0557**	**0.2198**	**0.5247**	**2.1500e-003**	**0.1932**	**2.6500e-003**	**0.1959**	**0.0518**	**2.5100e-003**	**0.0543**		**223.5942**	**223.5942**	**8.2900e-003**	**0.0154**	**228.4001**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0243	0.0000	0.0243	3.6700e-003	0.0000	3.6700e-003			0.0000			0.0000
Off-Road	2.6392	25.7194	20.5941	0.0388		1.2427	1.2427		1.1553	1.1553	0.0000	3,746.7812	3,746.7812	1.0524		3,773.0920
Total	**2.6392**	**25.7194**	**20.5941**	**0.0388**	**0.0243**	**1.2427**	**1.2669**	**3.6700e-003**	**1.1553**	**1.1589**	**0.0000**	**3,746.7812**	**3,746.7812**	**1.0524**		**3,773.0920**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.5600e-003	0.1865	0.0660	7.6000e-004	0.0239	1.7500e-003	0.0257	6.9600e-003	1.6800e-003	8.6300e-003		82.9691	82.9691	4.7400e-003	0.0119	86.6334
Worker	0.0491	0.0333	0.4587	1.3900e-003	0.1546	9.0000e-004	0.1555	0.0413	8.3000e-004	0.0421		140.6252	140.6252	3.5500e-003	3.5300e-003	141.7667
Total	**0.0557**	**0.2198**	**0.5247**	**2.1500e-003**	**0.1785**	**2.6500e-003**	**0.1811**	**0.0482**	**2.5100e-003**	**0.0507**		**223.5942**	**223.5942**	**8.2900e-003**	**0.0154**	**228.4001**

3.3 Asphalt Demolition Debris Haul - 2022

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	9.2200e-003	0.3776	0.1035	1.3900e-003	0.0407	2.7500e-003	0.0435	0.0111	2.6400e-003	0.0138		157.7933	157.7933	0.0150	0.0253	165.7004
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total	**9.2200e-003**	**0.3776**	**0.1035**	**1.3900e-003**	**0.0407**	**2.7500e-003**	**0.0435**	**0.0111**	**2.6400e-003**	**0.0138**		**157.7933**	**157.7933**	**0.0150**	**0.0253**	**165.7004**

Mitigated Construction On-Site

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	9.2200e-003	0.3776	0.1035	1.3900e-003	0.0379	2.7500e-003	0.0407	0.0105	2.6400e-003	0.0131		157.7933	157.7933	0.0150	0.0253	165.7004
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total	**9.2200e-003**	**0.3776**	**0.1035**	**1.3900e-003**	**0.0379**	**2.7500e-003**	**0.0407**	**0.0105**	**2.6400e-003**	**0.0131**		**157.7933**	**157.7933**	**0.0150**	**0.0253**	**165.7004**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.4 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					19.6570	0.0000	19.6570	10.1025	0.0000	10.1025			0.0000			0.0000
Off-Road	3.1701	33.0835	19.6978	0.0380		1.6126	1.6126		1.4836	1.4836		3,686.0619	3,686.0619	1.1922		3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**	**0.0380**	**19.6570**	**1.6126**	**21.2696**	**10.1025**	**1.4836**	**11.5860**		**3,686.0619**	**3,686.0619**	**1.1922**		**3,715.8655**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.5600e-003	0.1865	0.0660	7.6000e-004	0.0256	1.7500e-003	0.0273	7.3600e-003	1.6800e-003	9.0400e-003		82.9691	82.9691	4.7400e-003	0.0119	86.6334
Worker	0.0590	0.0400	0.5505	1.6700e-003	0.2012	1.0800e-003	0.2023	0.0534	1.0000e-003	0.0544		168.7502	168.7502	4.2600e-003	4.2400e-003	170.1200
Total	**0.0655**	**0.2265**	**0.6165**	**2.4300e-003**	**0.2268**	**2.8300e-003**	**0.2296**	**0.0607**	**2.6800e-003**	**0.0634**		**251.7192**	**251.7192**	**9.0000e-003**	**0.0161**	**256.7535**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.4034	0.0000	8.4034	4.3188	0.0000	4.3188			0.0000			0.0000
Off-Road	3.1701	33.0835	19.6978	0.0380		1.6126	1.6126		1.4836	1.4836	0.0000	3,686.0619	3,686.0619	1.1922		3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**	**0.0380**	**8.4034**	**1.6126**	**10.0159**	**4.3188**	**1.4836**	**5.8024**	**0.0000**	**3,686.0619**	**3,686.0619**	**1.1922**		**3,715.8655**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.5600e-003	0.1865	0.0660	7.6000e-004	0.0239	1.7500e-003	0.0257	6.9600e-003	1.6800e-003	8.6300e-003		82.9691	82.9691	4.7400e-003	0.0119	86.6334
Worker	0.0590	0.0400	0.5505	1.6700e-003	0.1855	1.0800e-003	0.1865	0.0495	1.0000e-003	0.0505		168.7502	168.7502	4.2600e-003	4.2400e-003	170.1200
Total	**0.0655**	**0.2265**	**0.6165**	**2.4300e-003**	**0.2094**	**2.8300e-003**	**0.2122**	**0.0565**	**2.6800e-003**	**0.0591**		**251.7192**	**251.7192**	**9.0000e-003**	**0.0161**	**256.7535**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.5 Site Preparation Soil Haul - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.8100e-003	0.0000	1.8100e-003	2.7000e-004	0.0000	2.7000e-004			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.8100e-003**	**0.0000**	**1.8100e-003**	**2.7000e-004**	**0.0000**	**2.7000e-004**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	7.9000e-003	0.3236	0.0887	1.1900e-003	0.0349	2.3600e-003	0.0372	9.5500e-003	2.2600e-003	0.0118		135.2514	135.2514	0.0129	0.0217	142.0289
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total	**7.9000e-003**	**0.3236**	**0.0887**	**1.1900e-003**	**0.0349**	**2.3600e-003**	**0.0372**	**9.5500e-003**	**2.2600e-003**	**0.0118**		**135.2514**	**135.2514**	**0.0129**	**0.0217**	**142.0289**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					7.7000e-004	0.0000	7.7000e-004	1.2000e-004	0.0000	1.2000e-004			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**7.7000e-004**	**0.0000**	**7.7000e-004**	**1.2000e-004**	**0.0000**	**1.2000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	7.9000e-003	0.3236	0.0887	1.1900e-003	0.0325	2.3600e-003	0.0349	8.9700e-003	2.2600e-003	0.0112		135.2514	135.2514	0.0129	0.0217	142.0289
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total	**7.9000e-003**	**0.3236**	**0.0887**	**1.1900e-003**	**0.0325**	**2.3600e-003**	**0.0349**	**8.9700e-003**	**2.2600e-003**	**0.0112**		**135.2514**	**135.2514**	**0.0129**	**0.0217**	**142.0289**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.6 Rough Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					9.2036	0.0000	9.2036	3.6538	0.0000	3.6538			0.0000			0.0000
Off-Road	3.6248	38.8435	29.0415	0.0621		1.6349	1.6349		1.5041	1.5041		6,011.4105	6,011.4105	1.9442		6,060.0158
Total	**3.6248**	**38.8435**	**29.0415**	**0.0621**	**9.2036**	**1.6349**	**10.8385**	**3.6538**	**1.5041**	**5.1579**		**6,011.4105**	**6,011.4105**	**1.9442**		**6,060.0158**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.5600e-003	0.1865	0.0660	7.6000e-004	0.0256	1.7500e-003	0.0273	7.3600e-003	1.6800e-003	9.0400e-003		82.9691	82.9691	4.7400e-003	0.0119	86.6334
Worker	0.0655	0.0444	0.6116	1.8600e-003	0.2236	1.2000e-003	0.2248	0.0593	1.1100e-003	0.0604		187.5002	187.5002	4.7400e-003	4.7100e-003	189.0222
Total	**0.0721**	**0.2309**	**0.6776**	**2.6200e-003**	**0.2491**	**2.9500e-003**	**0.2521**	**0.0667**	**2.7900e-003**	**0.0694**		**270.4693**	**270.4693**	**9.4800e-003**	**0.0166**	**275.6557**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.9345	0.0000	3.9345	1.5620	0.0000	1.5620			0.0000			0.0000
Off-Road	3.6248	38.8435	29.0415	0.0621		1.6349	1.6349		1.5041	1.5041	0.0000	6,011.4105	6,011.4105	1.9442		6,060.0158
Total	**3.6248**	**38.8435**	**29.0415**	**0.0621**	**3.9345**	**1.6349**	**5.5694**	**1.5620**	**1.5041**	**3.0661**	**0.0000**	**6,011.4105**	**6,011.4105**	**1.9442**		**6,060.0158**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.5600e-003	0.1865	0.0660	7.6000e-004	0.0239	1.7500e-003	0.0257	6.9600e-003	1.6800e-003	8.6300e-003		82.9691	82.9691	4.7400e-003	0.0119	86.6334
Worker	0.0655	0.0444	0.6116	1.8600e-003	0.2061	1.2000e-003	0.2073	0.0550	1.1100e-003	0.0561		187.5002	187.5002	4.7400e-003	4.7100e-003	189.0222
Total	**0.0721**	**0.2309**	**0.6776**	**2.6200e-003**	**0.2300**	**2.9500e-003**	**0.2330**	**0.0620**	**2.7900e-003**	**0.0647**		**270.4693**	**270.4693**	**9.4800e-003**	**0.0166**	**275.6557**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.7 Utility Trenching - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2024	1.7770	3.2551	5.1700e-003		0.0859	0.0859		0.0790	0.0790		500.0153	500.0153	0.1617		504.0582
Total	**0.2024**	**1.7770**	**3.2551**	**5.1700e-003**		**0.0859**	**0.0859**		**0.0790**	**0.0790**		**500.0153**	**500.0153**	**0.1617**		**504.0582**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.8300e-003	6.6600e-003	0.0917	2.8000e-004	0.0335	1.8000e-004	0.0337	8.8900e-003	1.7000e-004	9.0600e-003		28.1250	28.1250	7.1000e-004	7.1000e-004	28.3533
Total	**9.8300e-003**	**6.6600e-003**	**0.0917**	**2.8000e-004**	**0.0335**	**1.8000e-004**	**0.0337**	**8.8900e-003**	**1.7000e-004**	**9.0600e-003**		**28.1250**	**28.1250**	**7.1000e-004**	**7.1000e-004**	**28.3533**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2024	1.7770	3.2551	5.1700e-003		0.0859	0.0859		0.0790	0.0790	0.0000	500.0153	500.0153	0.1617		504.0582
Total	**0.2024**	**1.7770**	**3.2551**	**5.1700e-003**		**0.0859**	**0.0859**		**0.0790**	**0.0790**	**0.0000**	**500.0153**	**500.0153**	**0.1617**		**504.0582**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.8300e-003	6.6600e-003	0.0917	2.8000e-004	0.0309	1.8000e-004	0.0311	8.2500e-003	1.7000e-004	8.4200e-003		28.1250	28.1250	7.1000e-004	7.1000e-004	28.3533
Total	**9.8300e-003**	**6.6600e-003**	**0.0917**	**2.8000e-004**	**0.0309**	**1.8000e-004**	**0.0311**	**8.2500e-003**	**1.7000e-004**	**8.4200e-003**		**28.1250**	**28.1250**	**7.1000e-004**	**7.1000e-004**	**28.3533**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.8 Fine Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					9.2036	0.0000	9.2036	3.6538	0.0000	3.6538			0.0000			0.0000
Off-Road	3.6248	38.8435	29.0415	0.0621		1.6349	1.6349		1.5041	1.5041		6,011.4105	6,011.4105	1.9442		6,060.0158
Total	**3.6248**	**38.8435**	**29.0415**	**0.0621**	**9.2036**	**1.6349**	**10.8385**	**3.6538**	**1.5041**	**5.1579**		**6,011.4105**	**6,011.4105**	**1.9442**		**6,060.0158**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.5600e-003	0.1865	0.0660	7.6000e-004	0.0256	1.7500e-003	0.0273	7.3600e-003	1.6800e-003	9.0400e-003		82.9691	82.9691	4.7400e-003	0.0119	86.6334
Worker	0.0655	0.0444	0.6116	1.8600e-003	0.2236	1.2000e-003	0.2248	0.0593	1.1100e-003	0.0604		187.5002	187.5002	4.7400e-003	4.7100e-003	189.0222
Total	**0.0721**	**0.2309**	**0.6776**	**2.6200e-003**	**0.2491**	**2.9500e-003**	**0.2521**	**0.0667**	**2.7900e-003**	**0.0694**		**270.4693**	**270.4693**	**9.4800e-003**	**0.0166**	**275.6557**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.9345	0.0000	3.9345	1.5620	0.0000	1.5620			0.0000			0.0000
Off-Road	3.6248	38.8435	29.0415	0.0621		1.6349	1.6349		1.5041	1.5041	0.0000	6,011.4105	6,011.4105	1.9442		6,060.0158
Total	**3.6248**	**38.8435**	**29.0415**	**0.0621**	**3.9345**	**1.6349**	**5.5694**	**1.5620**	**1.5041**	**3.0661**	**0.0000**	**6,011.4105**	**6,011.4105**	**1.9442**		**6,060.0158**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.5600e-003	0.1865	0.0660	7.6000e-004	0.0239	1.7500e-003	0.0257	6.9600e-003	1.6800e-003	8.6300e-003		82.9691	82.9691	4.7400e-003	0.0119	86.6334
Worker	0.0655	0.0444	0.6116	1.8600e-003	0.2061	1.2000e-003	0.2073	0.0550	1.1100e-003	0.0561		187.5002	187.5002	4.7400e-003	4.7100e-003	189.0222
Total	**0.0721**	**0.2309**	**0.6776**	**2.6200e-003**	**0.2300**	**2.9500e-003**	**0.2330**	**0.0620**	**2.7900e-003**	**0.0647**		**270.4693**	**270.4693**	**9.4800e-003**	**0.0166**	**275.6557**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.9 Asphalt Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225		2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.1667					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.2696**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**		**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0491	0.0333	0.4587	1.3900e-003	0.1677	9.0000e-004	0.1686	0.0445	8.3000e-004	0.0453		140.6252	140.6252	3.5500e-003	3.5300e-003	141.7667
Total	**0.0491**	**0.0333**	**0.4587**	**1.3900e-003**	**0.1677**	**9.0000e-004**	**0.1686**	**0.0445**	**8.3000e-004**	**0.0453**		**140.6252**	**140.6252**	**3.5500e-003**	**3.5300e-003**	**141.7667**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.1028	11.1249	14.5805	0.0228		0.5679	0.5679		0.5225	0.5225	0.0000	2,207.6603	2,207.6603	0.7140		2,225.5104
Paving	0.1667					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.2696**	**11.1249**	**14.5805**	**0.0228**		**0.5679**	**0.5679**		**0.5225**	**0.5225**	**0.0000**	**2,207.6603**	**2,207.6603**	**0.7140**		**2,225.5104**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0491	0.0333	0.4587	1.3900e-003	0.1546	9.0000e-004	0.1555	0.0413	8.3000e-004	0.0421		140.6252	140.6252	3.5500e-003	3.5300e-003	141.7667
Total	**0.0491**	**0.0333**	**0.4587**	**1.3900e-003**	**0.1546**	**9.0000e-004**	**0.1555**	**0.0413**	**8.3000e-004**	**0.0421**		**140.6252**	**140.6252**	**3.5500e-003**	**3.5300e-003**	**141.7667**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.10 Finishing/Landscaping - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2034	1.7859	3.2714	5.1900e-003		0.0864	0.0864		0.0794	0.0794		502.5154	502.5154	0.1625		506.5784
Total	**0.2034**	**1.7859**	**3.2714**	**5.1900e-003**		**0.0864**	**0.0864**		**0.0794**	**0.0794**		**502.5154**	**502.5154**	**0.1625**		**506.5784**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1328	3.7769	1.3367	0.0153	0.5179	0.0355	0.5534	0.1491	0.0340	0.1830		1,680.1233	1,680.1233	0.0961	0.2410	1,754.3272
Worker	0.6847	0.4639	6.3915	0.0194	2.3361	0.0126	2.3487	0.6196	0.0116	0.6311		1,959.3770	1,959.3770	0.0495	0.0492	1,975.2823
Total	**0.8175**	**4.2408**	**7.7282**	**0.0347**	**2.8541**	**0.0481**	**2.9021**	**0.7686**	**0.0455**	**0.8142**		**3,639.5003**	**3,639.5003**	**0.1456**	**0.2902**	**3,729.6095**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.2034	1.7859	3.2714	5.1900e-003		0.0864	0.0864		0.0794	0.0794	0.0000	502.5154	502.5154	0.1625		506.5784
Total	**0.2034**	**1.7859**	**3.2714**	**5.1900e-003**		**0.0864**	**0.0864**		**0.0794**	**0.0794**	**0.0000**	**502.5154**	**502.5154**	**0.1625**		**506.5784**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1328	3.7769	1.3367	0.0153	0.4847	0.0355	0.5202	0.1409	0.0340	0.1749		1,680.1233	1,680.1233	0.0961	0.2410	1,754.3272
Worker	0.6847	0.4639	6.3915	0.0194	2.1533	0.0126	2.1659	0.5747	0.0116	0.5863		1,959.3770	1,959.3770	0.0495	0.0492	1,975.2823
Total	**0.8175**	**4.2408**	**7.7282**	**0.0347**	**2.6380**	**0.0481**	**2.6861**	**0.7156**	**0.0455**	**0.7611**		**3,639.5003**	**3,639.5003**	**0.1456**	**0.2902**	**3,729.6095**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.10 Finishing/Landscaping - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.1896	1.5564	3.2741	5.1900e-003		0.0762	0.0762		0.0701	0.0701		502.6062	502.6062	0.1626		506.6700
Total	**0.1896**	**1.5564**	**3.2741**	**5.1900e-003**		**0.0762**	**0.0762**		**0.0701**	**0.0701**		**502.6062**	**502.6062**	**0.1626**		**506.6700**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0789	2.9653	1.2146	0.0146	0.5179	0.0147	0.5326	0.1491	0.0140	0.1631		1,601.6923	1,601.6923	0.0949	0.2300	1,672.6051
Worker	0.6432	0.4134	5.9456	0.0188	2.3361	0.0119	2.3480	0.6196	0.0110	0.6305		1,897.2642	1,897.2642	0.0449	0.0458	1,912.0328
Total	**0.7221**	**3.3787**	**7.1602**	**0.0334**	**2.8541**	**0.0266**	**2.8806**	**0.7686**	**0.0250**	**0.7936**		**3,498.9565**	**3,498.9565**	**0.1397**	**0.2758**	**3,584.6380**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.1896	1.5564	3.2741	5.1900e-003		0.0762	0.0762		0.0701	0.0701	0.0000	502.6062	502.6062	0.1626		506.6700
Total	**0.1896**	**1.5564**	**3.2741**	**5.1900e-003**		**0.0762**	**0.0762**		**0.0701**	**0.0701**	**0.0000**	**502.6062**	**502.6062**	**0.1626**		**506.6700**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0789	2.9653	1.2146	0.0146	0.4847	0.0147	0.4993	0.1409	0.0140	0.1549		1,601.6923	1,601.6923	0.0949	0.2300	1,672.6051
Worker	0.6432	0.4134	5.9456	0.0188	2.1533	0.0119	2.1653	0.5747	0.0110	0.5857		1,897.2642	1,897.2642	0.0449	0.0458	1,912.0328
Total	**0.7221**	**3.3787**	**7.1602**	**0.0334**	**2.6380**	**0.0266**	**2.6646**	**0.7156**	**0.0250**	**0.7406**		**3,498.9565**	**3,498.9565**	**0.1397**	**0.2758**	**3,584.6380**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.11 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	7.0053					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817		281.4481	281.4481	0.0183		281.9062
Total	**7.2099**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**		**281.4481**	**281.4481**	**0.0183**		**281.9062**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.1376	0.0932	1.2844	3.9000e-003	0.4695	2.5300e-003	0.4720	0.1245	2.3300e-003	0.1268		393.7504	393.7504	9.9500e-003	9.8900e-003	396.9467
Total	**0.1376**	**0.0932**	**1.2844**	**3.9000e-003**	**0.4695**	**2.5300e-003**	**0.4720**	**0.1245**	**2.3300e-003**	**0.1268**		**393.7504**	**393.7504**	**9.9500e-003**	**9.8900e-003**	**396.9467**

Oak Creek Community Park Expansion & Improvement Plan - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	7.0053					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817	0.0000	281.4481	281.4481	0.0183		281.9062
Total	**7.2099**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**	**0.0000**	**281.4481**	**281.4481**	**0.0183**		**281.9062**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.1376	0.0932	1.2844	3.9000e-003	0.4327	2.5300e-003	0.4353	0.1155	2.3300e-003	0.1178		393.7504	393.7504	9.9500e-003	9.8900e-003	396.9467
Total	**0.1376**	**0.0932**	**1.2844**	**3.9000e-003**	**0.4327**	**2.5300e-003**	**0.4353**	**0.1155**	**2.3300e-003**	**0.1178**		**393.7504**	**393.7504**	**9.9500e-003**	**9.8900e-003**	**396.9467**

CalEEMod Existing Conditions Model

Oak Creek Community Park Expansion & Improvement Plan, Existing Conditions 2021 - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Oak Creek Community Park Expansion & Improvement Plan, Existing Conditions 2021

Orange County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	0.60	Acre	0.60	26,159.00	0
Other Non-Asphalt Surfaces	2.03	Acre	2.03	88,407.00	0
Parking Lot	1.32	Acre	1.32	57,595.00	0
City Park	6.34	Acre	6.34	276,083.00	0
Racquet Club	2.60	1000sqft	0.06	2,602.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2021
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	509.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Based on 2020 Sustainability Report.

Land Use - Based on applicant info., see assumptions file

Construction Phase -

Vehicle Trips - Assume 100% primary trips, total trips assumed to be from City Park land use only, see assumptions file

Vehicle Emission Factors -

Vehicle Emission Factors -

Oak Creek Community Park Expansion & Improvement Plan, Existing Conditions 2021 - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Vehicle Emission Factors -

Area Coating - Existing parking lot will be re-striped, see assumptions file

Water And Wastewater - Assume 100% aerobic treatment, exclude indoor water use since City Park Buildings will not be modified, see assumptions file

Solid Waste - See assumptions file

Fleet Mix - See fleetmix assumptions worksheet

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Parking	10330	3456
tblFleetMix	HHD	4.8120e-003	9.7100e-004
tblFleetMix	HHD	4.8120e-003	4.8550e-003
tblFleetMix	HHD	4.8120e-003	4.8550e-003
tblFleetMix	HHD	4.8120e-003	4.8550e-003
tblFleetMix	HHD	4.8120e-003	4.8550e-003
tblFleetMix	HHD	4.8120e-003	4.8550e-003
tblFleetMix	LDA	0.54	0.65
tblFleetMix	LDA	0.54	0.54
tblFleetMix	LDA	0.54	0.54
tblFleetMix	LDA	0.54	0.54
tblFleetMix	LDA	0.54	0.54
tblFleetMix	LDT1	0.06	0.07
tblFleetMix	LDT1	0.06	0.06
tblFleetMix	LDT1	0.06	0.06
tblFleetMix	LDT1	0.06	0.06
tblFleetMix	LDT1	0.06	0.06
tblFleetMix	LDT2	0.19	0.22
tblFleetMix	LDT2	0.19	0.19
tblFleetMix	LDT2	0.19	0.19
tblFleetMix	LDT2	0.19	0.19
tblFleetMix	LDT2	0.19	0.19

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tblFleetMix	LHD1	0.02	4.8760e-003
tblFleetMix	LHD1	0.02	0.02
tblFleetMix	LHD1	0.02	0.02
tblFleetMix	LHD1	0.02	0.02
tblFleetMix	LHD1	0.02	0.02
tblFleetMix	LHD2	6.3240e-003	1.3040e-003
tblFleetMix	LHD2	6.3240e-003	6.5220e-003
tblFleetMix	LHD2	6.3240e-003	6.5220e-003
tblFleetMix	LHD2	6.3240e-003	6.5220e-003
tblFleetMix	LHD2	6.3240e-003	6.5220e-003
tblFleetMix	MCY	0.02	0.03
tblFleetMix	MCY	0.02	0.02
tblFleetMix	MCY	0.02	0.02
tblFleetMix	MCY	0.02	0.02
tblFleetMix	MCY	0.02	0.02
tblFleetMix	MDV	0.13	0.02
tblFleetMix	MDV	0.13	0.13
tblFleetMix	MDV	0.13	0.13
tblFleetMix	MDV	0.13	0.13
tblFleetMix	MDV	0.13	0.13
tblFleetMix	MH	4.0970e-003	0.00
tblFleetMix	MH	4.0970e-003	3.9420e-003
tblFleetMix	MH	4.0970e-003	3.9420e-003
tblFleetMix	MH	4.0970e-003	3.9420e-003
tblFleetMix	MH	4.0970e-003	3.9420e-003
tblFleetMix	MHD	0.01	2.8480e-003
tblFleetMix	MHD	0.01	0.01

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tblFleetMix	MHD	0.01	0.01
tblFleetMix	MHD	0.01	0.01
tblFleetMix	MHD	0.01	0.01
tblFleetMix	OBUS	6.7400e-004	0.00
tblFleetMix	OBUS	6.7400e-004	6.5600e-004
tblFleetMix	OBUS	6.7400e-004	6.5600e-004
tblFleetMix	OBUS	6.7400e-004	6.5600e-004
tblFleetMix	OBUS	6.7400e-004	6.5600e-004
tblFleetMix	SBUS	7.4800e-004	0.00
tblFleetMix	SBUS	7.4800e-004	7.2300e-004
tblFleetMix	SBUS	7.4800e-004	7.2300e-004
tblFleetMix	SBUS	7.4800e-004	7.2300e-004
tblFleetMix	SBUS	7.4800e-004	7.2300e-004
tblFleetMix	SBUS	7.4800e-004	7.2300e-004
tblFleetMix	UBUS	3.9400e-004	0.00
tblFleetMix	UBUS	3.9400e-004	3.8500e-004
tblFleetMix	UBUS	3.9400e-004	3.8500e-004
tblFleetMix	UBUS	3.9400e-004	3.8500e-004
tblFleetMix	UBUS	3.9400e-004	3.8500e-004
tblLandUse	LandUseSquareFeet	26,136.00	26,159.00
tblLandUse	LandUseSquareFeet	88,426.80	88,407.00
tblLandUse	LandUseSquareFeet	57,499.20	57,595.00
tblLandUse	LandUseSquareFeet	276,170.40	276,083.00
tblLandUse	LandUseSquareFeet	2,600.00	2,602.00
tblProjectCharacteristics	CO2IntensityFactor	390.98	509.98
tblSolidWaste	SolidWasteGenerationRate	0.55	0.93
tblSolidWaste	SolidWasteGenerationRate	14.82	0.00
tblVehicleTrips	DV_TP	28.00	0.00

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tblVehicleTrips	PB_TP	6.00	0.00
tblVehicleTrips	PR_TP	66.00	100.00
tblVehicleTrips	ST_TR	1.96	125.28
tblVehicleTrips	ST_TR	21.35	0.00
tblVehicleTrips	SU_TR	2.19	125.28
tblVehicleTrips	SU_TR	17.40	0.00
tblVehicleTrips	WD_TR	0.78	62.64
tblVehicleTrips	WD_TR	14.03	0.00
tblWater	AerobicPercent	87.46	100.00
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	0.00
tblWater	IndoorWaterUseRate	153,772.17	0.00
tblWater	OutdoorWaterUseRate	7,553,991.76	9,475,747.08
tblWater	OutdoorWaterUseRate	94,247.46	0.00
tblWater	SepticTankPercent	10.33	0.00

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0252	0.0000	1.7000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.2000e-004	3.2000e-004	0.0000	0.0000	3.4000e-004
Energy	2.9000e-004	2.6500e-003	2.2200e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	12.5234	12.5234	6.8000e-004	1.3000e-004	12.5786
Mobile	0.3382	0.2709	3.5256	6.5400e-003	0.7496	4.7400e-003	0.7543	0.1989	4.3900e-003	0.2033	0.0000	601.2812	601.2812	0.0412	0.0216	608.7414
Waste						0.0000	0.0000		0.0000	0.0000	0.1888	0.0000	0.1888	0.0112	0.0000	0.4677
Water						0.0000	0.0000		0.0000	0.0000	0.0000	24.3527	24.3527	1.5800e-003	1.9000e-004	24.4490
Total	**0.3637**	**0.2736**	**3.5280**	**6.5600e-003**	**0.7496**	**4.9400e-003**	**0.7545**	**0.1989**	**4.5900e-003**	**0.2035**	**0.1888**	**638.1575**	**638.3463**	**0.0546**	**0.0219**	**646.2370**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0252	0.0000	1.7000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.2000e-004	3.2000e-004	0.0000	0.0000	3.4000e-004
Energy	2.9000e-004	2.6500e-003	2.2200e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	12.5234	12.5234	6.8000e-004	1.3000e-004	12.5786
Mobile	0.3382	0.2709	3.5256	6.5400e-003	0.7496	4.7400e-003	0.7543	0.1989	4.3900e-003	0.2033	0.0000	601.2812	601.2812	0.0412	0.0216	608.7414
Waste						0.0000	0.0000		0.0000	0.0000	0.1888	0.0000	0.1888	0.0112	0.0000	0.4677
Water						0.0000	0.0000		0.0000	0.0000	0.0000	24.3527	24.3527	1.5800e-003	1.9000e-004	24.4490

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Total	**0.3637**	**0.2736**	**3.5280**	**6.5600e-003**	**0.7496**	**4.9400e-003**	**0.7545**	**0.1989**	**4.5900e-003**	**0.2035**	**0.1888**	**638.1575**	**638.3463**	**0.0546**	**0.0219**	**646.2370**

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	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.3382	0.2709	3.5256	6.5400e-003	0.7496	4.7400e-003	0.7543	0.1989	4.3900e-003	0.2033	0.0000	601.2812	601.2812	0.0412	0.0216	608.7414
Unmitigated	0.3382	0.2709	3.5256	6.5400e-003	0.7496	4.7400e-003	0.7543	0.1989	4.3900e-003	0.2033	0.0000	601.2812	601.2812	0.0412	0.0216	608.7414

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	397.14	794.28	794.28	2,011,195	2,011,195
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Racquet Club	0.00	0.00	0.00		
Total	397.14	794.28	794.28	2,011,195	2,011,195

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	16.60	8.40	6.90	33.00	48.00	19.00	100	0	0
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Racquet Club	16.60	8.40	6.90	11.50	69.50	19.00	52	39	9

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.646291	0.069827	0.221723	0.020000	0.004876	0.001304	0.002848	0.000971	0.000000	0.000000	0.032159	0.000000	0.000000
Other Asphalt Surfaces	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942
Other Non-Asphalt Surfaces	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942
Parking Lot	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942
Racquet Club	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942

5.0 Energy Detail

Historical Energy Use: N

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	9.6408	9.6408	6.2000e-004	8.0000e-005	9.6789
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	9.6408	9.6408	6.2000e-004	8.0000e-005	9.6789
NaturalGas Mitigated	2.9000e-004	2.6500e-003	2.2200e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	2.8826	2.8826	6.0000e-005	5.0000e-005	2.8997
NaturalGas Unmitigated	2.9000e-004	2.6500e-003	2.2200e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	2.8826	2.8826	6.0000e-005	5.0000e-005	2.8997

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Racquet Club	54017.5	2.9000e-004	2.6500e-003	2.2200e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	2.8826	2.8826	6.0000e-005	5.0000e-005	2.8997
Total		**2.9000e-004**	**2.6500e-003**	**2.2200e-003**	**2.0000e-005**		**2.0000e-004**	**2.0000e-004**		**2.0000e-004**	**2.0000e-004**	**0.0000**	**2.8826**	**2.8826**	**6.0000e-005**	**5.0000e-005**	**2.8997**

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Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Racquet Club	54017.5	2.9000e-004	2.6500e-003	2.2200e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	2.8826	2.8826	6.0000e-005	5.0000e-005	2.8997
Total		**2.9000e-004**	**2.6500e-003**	**2.2200e-003**	**2.0000e-005**		**2.0000e-004**	**2.0000e-004**		**2.0000e-004**	**2.0000e-004**	**0.0000**	**2.8826**	**2.8826**	**6.0000e-005**	**5.0000e-005**	**2.8997**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	20158.3	4.6631	3.0000e-004	4.0000e-005	4.6815
Racquet Club	21518.5	4.9777	3.2000e-004	4.0000e-005	4.9974
Total		**9.6408**	**6.2000e-004**	**8.0000e-005**	**9.6789**

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Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	20158.3	4.6631	3.0000e-004	4.0000e-005	4.6815
Racquet Club	21518.5	4.9777	3.2000e-004	4.0000e-005	4.9974
Total		**9.6408**	**6.2000e-004**	**8.0000e-005**	**9.6789**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0252	0.0000	1.7000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.2000e-004	3.2000e-004	0.0000	0.0000	3.4000e-004
Unmitigated	0.0252	0.0000	1.7000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.2000e-004	3.2000e-004	0.0000	0.0000	3.4000e-004

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6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.0100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0231					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	2.0000e-005	0.0000	1.7000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.2000e-004	3.2000e-004	0.0000	0.0000	3.4000e-004
Total	**0.0252**	**0.0000**	**1.7000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**3.2000e-004**	**3.2000e-004**	**0.0000**	**0.0000**	**3.4000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.0100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0231					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	2.0000e-005	0.0000	1.7000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.2000e-004	3.2000e-004	0.0000	0.0000	3.4000e-004

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Total	**0.0252**	**0.0000**	**1.7000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**3.2000e-004**	**3.2000e-004**	**0.0000**	**0.0000**	**3.4000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	24.3527	1.5800e-003	1.9000e-004	24.4490
Unmitigated	24.3527	1.5800e-003	1.9000e-004	24.4490

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 9.47575	24.3527	1.5800e-003	1.9000e-004	24.4490
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Racquet Club	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**24.3527**	**1.5800e-003**	**1.9000e-004**	**24.4490**

Oak Creek Community Park Expansion & Improvement Plan, Existing Conditions 2021 - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 9.47575	24.3527	1.5800e-003	1.9000e-004	24.4490
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Racquet Club	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**24.3527**	**1.5800e-003**	**1.9000e-004**	**24.4490**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.1888	0.0112	0.0000	0.4677
Unmitigated	0.1888	0.0112	0.0000	0.4677

8.2 Waste by Land Use

Oak Creek Community Park Expansion & Improvement Plan, Existing Conditions 2021 - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0.93	0.1888	0.0112	0.0000	0.4677
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Racquet Club	0	0.0000	0.0000	0.0000	0.0000
Total		**0.1888**	**0.0112**	**0.0000**	**0.4677**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	0.93	0.1888	0.0112	0.0000	0.4677
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Racquet Club	0	0.0000	0.0000	0.0000	0.0000
Total		**0.1888**	**0.0112**	**0.0000**	**0.4677**

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023 - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023

Orange County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	0.60	Acre	0.60	26,159.00	0
Other Non-Asphalt Surfaces	2.03	Acre	2.03	88,407.00	0
Parking Lot	1.32	Acre	1.32	57,595.00	0
City Park	6.34	Acre	6.34	276,083.00	0
Racquet Club	2.60	1000sqft	0.06	2,602.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2023
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	509.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Based on 2020 Sustainability Report.

Land Use - Based on applicant info., see assumptions file

Construction Phase -

Vehicle Trips - Assume 100% primary trips, total trips assumed to be from City Park land use only, see assumptions file

Area Coating - Existing parking lot will be re-striped, see assumptions file

Water And Wastewater - Assume 100% aerobic treatment, exclude indoor water use since City Park Buildings will not be modified, see assumptions file

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023 - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Solid Waste - See assumptions file

Fleet Mix - See fleetmix assumptions worksheet

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Parking	10330	3456
tblFleetMix	HHD	4.8550e-003	9.7100e-004
tblFleetMix	LDA	0.54	0.65
tblFleetMix	LDT1	0.06	0.07
tblFleetMix	LDT2	0.19	0.22
tblFleetMix	LHD1	0.02	4.8760e-003
tblFleetMix	LHD2	6.5220e-003	1.3040e-003
tblFleetMix	MCY	0.02	0.03
tblFleetMix	MDV	0.13	0.02
tblFleetMix	MH	3.9420e-003	0.00
tblFleetMix	MHD	0.01	2.8480e-003
tblFleetMix	OBUS	6.5600e-004	0.00
tblFleetMix	SBUS	7.2300e-004	0.00
tblFleetMix	UBUS	3.8500e-004	0.00
tblLandUse	LandUseSquareFeet	26,136.00	26,159.00
tblLandUse	LandUseSquareFeet	88,426.80	88,407.00
tblLandUse	LandUseSquareFeet	57,499.20	57,595.00
tblLandUse	LandUseSquareFeet	276,170.40	276,083.00
tblLandUse	LandUseSquareFeet	2,600.00	2,602.00
tblProjectCharacteristics	CO2IntensityFactor	390.98	509.98
tblSolidWaste	SolidWasteGenerationRate	0.55	0.93
tblSolidWaste	SolidWasteGenerationRate	14.82	0.00
tblVehicleTrips	DV_TP	28.00	0.00
tblVehicleTrips	PB_TP	6.00	0.00

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblVehicleTrips	PR_TP	66.00	100.00
tblVehicleTrips	ST_TR	1.96	125.28
tblVehicleTrips	ST_TR	21.35	0.00
tblVehicleTrips	SU_TR	2.19	125.28
tblVehicleTrips	SU_TR	17.40	0.00
tblVehicleTrips	WD_TR	0.78	62.64
tblVehicleTrips	WD_TR	14.03	0.00
tblWater	AerobicPercent	87.46	100.00
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	0.00
tblWater	IndoorWaterUseRate	153,772.17	0.00
tblWater	OutdoorWaterUseRate	7,553,991.76	9,475,747.08
tblWater	OutdoorWaterUseRate	94,247.46	0.00
tblWater	SepticTankPercent	10.33	0.00

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1378	1.0000e-005	1.3200e-003	0.0000		0.0000	0.0000		0.0000	0.0000		2.8200e-003	2.8200e-003	1.0000e-005		3.0100e-003
Energy	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
Mobile	2.7374	1.7486	27.6955	0.0543	6.5233	0.0340	6.5573	1.7285	0.0314	1.7599		5,563.2378	5,563.2378	0.3494	0.1717	5,623.1514
Total	**2.8768**	**1.7632**	**27.7090**	**0.0544**	**6.5233**	**0.0351**	**6.5584**	**1.7285**	**0.0325**	**1.7610**		**5,580.6516**	**5,580.6516**	**0.3497**	**0.1721**	**5,640.6688**

Mitigated Operational

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023 - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1378	1.0000e-005	1.3200e-003	0.0000		0.0000	0.0000		0.0000	0.0000		2.8200e-003	2.8200e-003	1.0000e-005		3.0100e-003
Energy	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
Mobile	2.7374	1.7486	27.6955	0.0543	6.5233	0.0340	6.5573	1.7285	0.0314	1.7599		5,563.2378	5,563.2378	0.3494	0.1717	5,623.1514
Total	**2.8768**	**1.7632**	**27.7090**	**0.0544**	**6.5233**	**0.0351**	**6.5584**	**1.7285**	**0.0325**	**1.7610**		**5,580.6516**	**5,580.6516**	**0.3497**	**0.1721**	**5,640.6688**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.7374	1.7486	27.6955	0.0543	6.5233	0.0340	6.5573	1.7285	0.0314	1.7599		5,563.2378	5,563.2378	0.3494	0.1717	5,623.1514
Unmitigated	2.7374	1.7486	27.6955	0.0543	6.5233	0.0340	6.5573	1.7285	0.0314	1.7599		5,563.2378	5,563.2378	0.3494	0.1717	5,623.1514

4.2 Trip Summary Information

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023 - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	397.14	794.28	794.28	2,011,195	2,011,195
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Racquet Club	0.00	0.00	0.00		
Total	397.14	794.28	794.28	2,011,195	2,011,195

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	16.60	8.40	6.90	33.00	48.00	19.00	100	0	0
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Racquet Club	16.60	8.40	6.90	11.50	69.50	19.00	52	39	9

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.646291	0.069827	0.221723	0.020000	0.004876	0.001304	0.002848	0.000971	0.000000	0.000000	0.032159	0.000000	0.000000
Other Asphalt Surfaces	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942
Other Non-Asphalt Surfaces	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942
Parking Lot	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942
Racquet Club	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023 - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
NaturalGas Unmitigated	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Racquet Club	147.993	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
Total		**1.6000e-003**	**0.0145**	**0.0122**	**9.0000e-005**		**1.1000e-003**	**1.1000e-003**		**1.1000e-003**	**1.1000e-003**		**17.4110**	**17.4110**	**3.3000e-004**	**3.2000e-004**	**17.5144**

Mitigated

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023 - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Racquet Club	0.147993	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
Total		**1.6000e-003**	**0.0145**	**0.0122**	**9.0000e-005**		**1.1000e-003**	**1.1000e-003**		**1.1000e-003**	**1.1000e-003**		**17.4110**	**17.4110**	**3.3000e-004**	**3.2000e-004**	**17.5144**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.1378	1.0000e-005	1.3200e-003	0.0000		0.0000	0.0000		0.0000	0.0000		2.8200e-003	2.8200e-003	1.0000e-005		3.0100e-003
Unmitigated	0.1378	1.0000e-005	1.3200e-003	0.0000		0.0000	0.0000		0.0000	0.0000		2.8200e-003	2.8200e-003	1.0000e-005		3.0100e-003

6.2 Area by SubCategory

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023 - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0110					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1267					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.2000e-004	1.0000e-005	1.3200e-003	0.0000		0.0000	0.0000		0.0000	0.0000		2.8200e-003	2.8200e-003	1.0000e-005		3.0100e-003
Total	**0.1378**	**1.0000e-005**	**1.3200e-003**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.8200e-003**	**2.8200e-003**	**1.0000e-005**		**3.0100e-003**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0110					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1267					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.2000e-004	1.0000e-005	1.3200e-003	0.0000		0.0000	0.0000		0.0000	0.0000		2.8200e-003	2.8200e-003	1.0000e-005		3.0100e-003
Total	**0.1378**	**1.0000e-005**	**1.3200e-003**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.8200e-003**	**2.8200e-003**	**1.0000e-005**		**3.0100e-003**

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023 - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023 - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023

Orange County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	0.60	Acre	0.60	26,159.00	0
Other Non-Asphalt Surfaces	2.03	Acre	2.03	88,407.00	0
Parking Lot	1.32	Acre	1.32	57,595.00	0
City Park	6.34	Acre	6.34	276,083.00	0
Racquet Club	2.60	1000sqft	0.06	2,602.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2023
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	509.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Based on 2020 Sustainability Report.

Land Use - Based on applicant info., see assumptions file

Construction Phase -

Vehicle Trips - Assume 100% primary trips, total trips assumed to be from City Park land use only, see assumptions file

Area Coating - Existing parking lot will be re-striped, see assumptions file

Water And Wastewater - Assume 100% aerobic treatment, exclude indoor water use since City Park Buildings will not be modified, see assumptions file

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023 - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Solid Waste - See assumptions file

Fleet Mix - See fleetmix assumptions worksheet

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Parking	10330	3456
tblFleetMix	HHD	4.8550e-003	9.7100e-004
tblFleetMix	LDA	0.54	0.65
tblFleetMix	LDT1	0.06	0.07
tblFleetMix	LDT2	0.19	0.22
tblFleetMix	LHD1	0.02	4.8760e-003
tblFleetMix	LHD2	6.5220e-003	1.3040e-003
tblFleetMix	MCY	0.02	0.03
tblFleetMix	MDV	0.13	0.02
tblFleetMix	MH	3.9420e-003	0.00
tblFleetMix	MHD	0.01	2.8480e-003
tblFleetMix	OBUS	6.5600e-004	0.00
tblFleetMix	SBUS	7.2300e-004	0.00
tblFleetMix	UBUS	3.8500e-004	0.00
tblLandUse	LandUseSquareFeet	26,136.00	26,159.00
tblLandUse	LandUseSquareFeet	88,426.80	88,407.00
tblLandUse	LandUseSquareFeet	57,499.20	57,595.00
tblLandUse	LandUseSquareFeet	276,170.40	276,083.00
tblLandUse	LandUseSquareFeet	2,600.00	2,602.00
tblProjectCharacteristics	CO2IntensityFactor	390.98	509.98
tblSolidWaste	SolidWasteGenerationRate	0.55	0.93
tblSolidWaste	SolidWasteGenerationRate	14.82	0.00
tblVehicleTrips	DV_TP	28.00	0.00
tblVehicleTrips	PB_TP	6.00	0.00

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023 - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblVehicleTrips	PR_TP	66.00	100.00
tblVehicleTrips	ST_TR	1.96	125.28
tblVehicleTrips	ST_TR	21.35	0.00
tblVehicleTrips	SU_TR	2.19	125.28
tblVehicleTrips	SU_TR	17.40	0.00
tblVehicleTrips	WD_TR	0.78	62.64
tblVehicleTrips	WD_TR	14.03	0.00
tblWater	AerobicPercent	87.46	100.00
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	0.00
tblWater	IndoorWaterUseRate	153,772.17	0.00
tblWater	OutdoorWaterUseRate	7,553,991.76	9,475,747.08
tblWater	OutdoorWaterUseRate	94,247.46	0.00
tblWater	SepticTankPercent	10.33	0.00

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1378	1.0000e-005	1.3200e-003	0.0000		0.0000	0.0000		0.0000	0.0000		2.8200e-003	2.8200e-003	1.0000e-005		3.0100e-003
Energy	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
Mobile	2.7347	1.9143	27.3374	0.0519	6.5233	0.0340	6.5573	1.7285	0.0314	1.7599		5,308.7320	5,308.7320	0.3608	0.1820	5,371.9923
Total	**2.8741**	**1.9288**	**27.3510**	**0.0519**	**6.5233**	**0.0351**	**6.5584**	**1.7285**	**0.0325**	**1.7610**		**5,326.1458**	**5,326.1458**	**0.3612**	**0.1823**	**5,389.5097**

Mitigated Operational

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023 - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1378	1.0000e-005	1.3200e-003	0.0000		0.0000	0.0000		0.0000	0.0000		2.8200e-003	2.8200e-003	1.0000e-005		3.0100e-003
Energy	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
Mobile	2.7347	1.9143	27.3374	0.0519	6.5233	0.0340	6.5573	1.7285	0.0314	1.7599		5,308.7320	5,308.7320	0.3608	0.1820	5,371.9923
Total	**2.8741**	**1.9288**	**27.3510**	**0.0519**	**6.5233**	**0.0351**	**6.5584**	**1.7285**	**0.0325**	**1.7610**		**5,326.1458**	**5,326.1458**	**0.3612**	**0.1823**	**5,389.5097**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.7347	1.9143	27.3374	0.0519	6.5233	0.0340	6.5573	1.7285	0.0314	1.7599		5,308.7320	5,308.7320	0.3608	0.1820	5,371.9923
Unmitigated	2.7347	1.9143	27.3374	0.0519	6.5233	0.0340	6.5573	1.7285	0.0314	1.7599		5,308.7320	5,308.7320	0.3608	0.1820	5,371.9923

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023 - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	397.14	794.28	794.28	2,011,195	2,011,195
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Racquet Club	0.00	0.00	0.00		
Total	397.14	794.28	794.28	2,011,195	2,011,195

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	16.60	8.40	6.90	33.00	48.00	19.00	100	0	0
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Racquet Club	16.60	8.40	6.90	11.50	69.50	19.00	52	39	9

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.646291	0.069827	0.221723	0.020000	0.004876	0.001304	0.002848	0.000971	0.000000	0.000000	0.032159	0.000000	0.000000
Other Asphalt Surfaces	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942
Other Non-Asphalt Surfaces	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942
Parking Lot	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942
Racquet Club	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023 - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
NaturalGas Unmitigated	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day											lb/day				
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Racquet Club	147.993	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
Total		**1.6000e-003**	**0.0145**	**0.0122**	**9.0000e-005**		**1.1000e-003**	**1.1000e-003**		**1.1000e-003**	**1.1000e-003**		**17.4110**	**17.4110**	**3.3000e-004**	**3.2000e-004**	**17.5144**

Mitigated

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023 - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Racquet Club	0.147993	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
Total		**1.6000e-003**	**0.0145**	**0.0122**	**9.0000e-005**		**1.1000e-003**	**1.1000e-003**		**1.1000e-003**	**1.1000e-003**		**17.4110**	**17.4110**	**3.3000e-004**	**3.2000e-004**	**17.5144**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.1378	1.0000e-005	1.3200e-003	0.0000		0.0000	0.0000		0.0000	0.0000		2.8200e-003	2.8200e-003	1.0000e-005		3.0100e-003
Unmitigated	0.1378	1.0000e-005	1.3200e-003	0.0000		0.0000	0.0000		0.0000	0.0000		2.8200e-003	2.8200e-003	1.0000e-005		3.0100e-003

6.2 Area by SubCategory

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023 - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0110					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1267					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.2000e-004	1.0000e-005	1.3200e-003	0.0000		0.0000	0.0000		0.0000	0.0000		2.8200e-003	2.8200e-003	1.0000e-005		3.0100e-003
Total	**0.1378**	**1.0000e-005**	**1.3200e-003**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.8200e-003**	**2.8200e-003**	**1.0000e-005**		**3.0100e-003**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0110					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1267					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.2000e-004	1.0000e-005	1.3200e-003	0.0000		0.0000	0.0000		0.0000	0.0000		2.8200e-003	2.8200e-003	1.0000e-005		3.0100e-003
Total	**0.1378**	**1.0000e-005**	**1.3200e-003**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.8200e-003**	**2.8200e-003**	**1.0000e-005**		**3.0100e-003**

7.0 Water Detail

Oak Creek Community Park Expansion & Improvement Plan, Baseline Conditions 2023 - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

CalEEMod Operations Model

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Oak Creek Community Park Expansion & Improvement Plan, Project Operations

Orange County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	38.59	1000sqft	0.89	38,586.00	0
Other Non-Asphalt Surfaces	63.96	1000sqft	1.47	63,956.00	0
Parking Lot	80.00	1000sqft	1.84	79,996.00	0
City Park	15.01	Acre	15.01	653,826.00	0
Racquet Club	2.60	1000sqft	0.06	2,602.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2023
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	509.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Based on 2020 Sustainability Report.

Land Use - Based on applicant info., see assumptions file

Construction Phase -

Vehicle Trips - Assume double trip generation on weekends compared to weekday, trip analysis provided by Urban Crossroads, total trips assumed to be with only City Park land use, see assumptions file

Fleet Mix - See fleet mix adjustment in assumptions file

Area Coating - See assumptions file

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Water And Wastewater - Exckyde indoor water use as City Park Buildings will not be modified, only outdoor water use is accounted for, assume 100% aerobic treatment, see assumptions file

Solid Waste - CalEEMod appendix D, see assumptions file

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Parking	10952	4800
tblFleetMix	HHD	4.8550e-003	9.7100e-004
tblFleetMix	LDA	0.54	0.65
tblFleetMix	LDT1	0.06	0.07
tblFleetMix	LDT2	0.19	0.22
tblFleetMix	LHD1	0.02	4.8760e-003
tblFleetMix	LHD2	6.5220e-003	1.3040e-003
tblFleetMix	MCY	0.02	0.03
tblFleetMix	MDV	0.13	0.02
tblFleetMix	MH	3.9420e-003	0.00
tblFleetMix	MHD	0.01	2.8480e-003
tblFleetMix	OBUS	6.5600e-004	0.00
tblFleetMix	SBUS	7.2300e-004	0.00
tblFleetMix	UBUS	3.8500e-004	0.00
tblLandUse	LandUseSquareFeet	38,590.00	38,586.00
tblLandUse	LandUseSquareFeet	63,960.00	63,956.00
tblLandUse	LandUseSquareFeet	80,000.00	79,996.00
tblLandUse	LandUseSquareFeet	653,835.60	653,826.00
tblLandUse	LandUseSquareFeet	2,600.00	2,602.00
tblProjectCharacteristics	CO2IntensityFactor	390.98	509.98
tblSolidWaste	SolidWasteGenerationRate	1.29	1.73
tblSolidWaste	SolidWasteGenerationRate	14.82	0.00
tblVehicleTrips	DV_TP	28.00	0.00

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblVehicleTrips	PB_TP	6.00	0.00
tblVehicleTrips	PR_TP	66.00	100.00
tblVehicleTrips	ST_TR	1.96	95.14
tblVehicleTrips	ST_TR	21.35	0.00
tblVehicleTrips	SU_TR	2.19	95.14
tblVehicleTrips	SU_TR	17.40	0.00
tblVehicleTrips	WD_TR	0.78	47.57
tblVehicleTrips	WD_TR	14.03	0.00
tblWater	AerobicPercent	87.46	100.00
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	0.00
tblWater	IndoorWaterUseRate	153,772.17	0.00
tblWater	OutdoorWaterUseRate	17,884,135.06	15,145,554.00
tblWater	OutdoorWaterUseRate	94,247.46	0.00
tblWater	SepticTankPercent	10.33	0.00

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0299	2.0000e-005	2.5500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	4.9700e-003	4.9700e-003	1.0000e-005	0.0000	5.2900e-003
Energy	2.9000e-004	2.6500e-003	2.2200e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	14.3370	14.3370	8.0000e-004	1.4000e-004	14.3995
Mobile	0.5637	0.4098	5.7915	0.0110	1.3477	7.1400e-003	1.3548	0.3576	6.5900e-003	0.3642	0.0000	1,024.9952	1,024.9952	0.0685	0.0351	1,037.1608
Waste						0.0000	0.0000		0.0000	0.0000	0.3512	0.0000	0.3512	0.0208	0.0000	0.8700
Water						0.0000	0.0000		0.0000	0.0000	0.0000	38.9241	38.9241	2.5200e-003	3.1000e-004	39.0780
Total	**0.5939**	**0.4124**	**5.7962**	**0.0111**	**1.3477**	**7.3500e-003**	**1.3550**	**0.3576**	**6.8000e-003**	**0.3644**	**0.3512**	**1,078.2613**	**1,078.6125**	**0.0925**	**0.0355**	**1,091.5136**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0299	2.0000e-005	2.5500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	4.9700e-003	4.9700e-003	1.0000e-005	0.0000	5.2900e-003
Energy	2.9000e-004	2.6500e-003	2.2200e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	14.3370	14.3370	8.0000e-004	1.4000e-004	14.3995
Mobile	0.5637	0.4098	5.7915	0.0110	1.3477	7.1400e-003	1.3548	0.3576	6.5900e-003	0.3642	0.0000	1,024.9952	1,024.9952	0.0685	0.0351	1,037.1608
Waste						0.0000	0.0000		0.0000	0.0000	0.3512	0.0000	0.3512	0.0208	0.0000	0.8700
Water						0.0000	0.0000		0.0000	0.0000	0.0000	38.9241	38.9241	2.5200e-003	3.1000e-004	39.0780
Total	**0.5939**	**0.4124**	**5.7962**	**0.0111**	**1.3477**	**7.3500e-003**	**1.3550**	**0.3576**	**6.8000e-003**	**0.3644**	**0.3512**	**1,078.2613**	**1,078.6125**	**0.0925**	**0.0355**	**1,091.5136**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.5637	0.4098	5.7915	0.0110	1.3477	7.1400e-003	1.3548	0.3576	6.5900e-003	0.3642	0.0000	1,024.9952	1,024.9952	0.0685	0.0351	1,037.1608
Unmitigated	0.5637	0.4098	5.7915	0.0110	1.3477	7.1400e-003	1.3548	0.3576	6.5900e-003	0.3642	0.0000	1,024.9952	1,024.9952	0.0685	0.0351	1,037.1608

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	714.03	1,428.05	1428.05	3,615,989	3,615,989
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Racquet Club	0.00	0.00	0.00		
Total	714.03	1,428.05	1,428.05	3,615,989	3,615,989

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	16.60	8.40	6.90	33.00	48.00	19.00	100	0	0
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Racquet Club	16.60	8.40	6.90	11.50	69.50	19.00	52	39	9

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.646291	0.069827	0.221723	0.020000	0.004876	0.001304	0.002848	0.000971	0.000000	0.000000	0.032159	0.000000	0.000000
Other Asphalt Surfaces	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942
Other Non-Asphalt Surfaces	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942
Parking Lot	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942
Racquet Club	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	11.4545	11.4545	7.4000e-004	9.0000e-005	11.4998
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	11.4545	11.4545	7.4000e-004	9.0000e-005	11.4998
NaturalGas Mitigated	2.9000e-004	2.6500e-003	2.2200e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	2.8826	2.8826	6.0000e-005	5.0000e-005	2.8997
NaturalGas Unmitigated	2.9000e-004	2.6500e-003	2.2200e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	2.8826	2.8826	6.0000e-005	5.0000e-005	2.8997

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Racquet Club	54017.5	2.9000e-004	2.6500e-003	2.2200e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	2.8826	2.8826	6.0000e-005	5.0000e-005	2.8997
Total		**2.9000e-004**	**2.6500e-003**	**2.2200e-003**	**2.0000e-005**		**2.0000e-004**	**2.0000e-004**		**2.0000e-004**	**2.0000e-004**	**0.0000**	**2.8826**	**2.8826**	**6.0000e-005**	**5.0000e-005**	**2.8997**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Racquet Club	54017.5	2.9000e-004	2.6500e-003	2.2200e-003	2.0000e-005		2.0000e-004	2.0000e-004		2.0000e-004	2.0000e-004	0.0000	2.8826	2.8826	6.0000e-005	5.0000e-005	2.8997
Total		**2.9000e-004**	**2.6500e-003**	**2.2200e-003**	**2.0000e-005**		**2.0000e-004**	**2.0000e-004**		**2.0000e-004**	**2.0000e-004**	**0.0000**	**2.8826**	**2.8826**	**6.0000e-005**	**5.0000e-005**	**2.8997**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	27998.6	6.4767	4.2000e-004	5.0000e-005	6.5023
Racquet Club	21518.5	4.9777	3.2000e-004	4.0000e-005	4.9974
Total		**11.4545**	**7.4000e-004**	**9.0000e-005**	**11.4998**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	27998.6	6.4767	4.2000e-004	5.0000e-005	6.5023
Racquet Club	21518.5	4.9777	3.2000e-004	4.0000e-005	4.9974
Total		**11.4545**	**7.4000e-004**	**9.0000e-005**	**11.4998**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0299	2.0000e-005	2.5500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	4.9700e-003	4.9700e-003	1.0000e-005	0.0000	5.2900e-003
Unmitigated	0.0299	2.0000e-005	2.5500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	4.9700e-003	4.9700e-003	1.0000e-005	0.0000	5.2900e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.3200e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0274					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	2.4000e-004	2.0000e-005	2.5500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	4.9700e-003	4.9700e-003	1.0000e-005	0.0000	5.2900e-003
Total	**0.0299**	**2.0000e-005**	**2.5500e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**4.9700e-003**	**4.9700e-003**	**1.0000e-005**	**0.0000**	**5.2900e-003**

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Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	2.3200e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0274					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	2.4000e-004	2.0000e-005	2.5500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	4.9700e-003	4.9700e-003	1.0000e-005	0.0000	5.2900e-003
Total	**0.0299**	**2.0000e-005**	**2.5500e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**4.9700e-003**	**4.9700e-003**	**1.0000e-005**	**0.0000**	**5.2900e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	38.9241	2.5200e-003	3.1000e-004	39.0780
Unmitigated	38.9241	2.5200e-003	3.1000e-004	39.0780

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 15.1456	38.9241	2.5200e-003	3.1000e-004	39.0780
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Racquet Club	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**38.9241**	**2.5200e-003**	**3.1000e-004**	**39.0780**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 15.1456	38.9241	2.5200e-003	3.1000e-004	39.0780
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Racquet Club	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**38.9241**	**2.5200e-003**	**3.1000e-004**	**39.0780**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.3512	0.0208	0.0000	0.8700
Unmitigated	0.3512	0.0208	0.0000	0.8700

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	1.73	0.3512	0.0208	0.0000	0.8700
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Racquet Club	0	0.0000	0.0000	0.0000	0.0000
Total		**0.3512**	**0.0208**	**0.0000**	**0.8700**

Mitigated

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	1.73	0.3512	0.0208	0.0000	0.8700
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Racquet Club	0	0.0000	0.0000	0.0000	0.0000
Total		**0.3512**	**0.0208**	**0.0000**	**0.8700**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Oak Creek Community Park Expansion & Improvement Plan, Project Operations

Orange County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	38.59	1000sqft	0.89	38,586.00	0
Other Non-Asphalt Surfaces	63.96	1000sqft	1.47	63,956.00	0
Parking Lot	80.00	1000sqft	1.84	79,996.00	0
City Park	15.01	Acre	15.01	653,826.00	0
Racquet Club	2.60	1000sqft	0.06	2,602.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2023
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	509.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Based on 2020 Sustainability Report.

Land Use - Based on applicant info., see assumptions file

Construction Phase -

Vehicle Trips - Assume double trip generation on weekends compared to weekday, trip analysis provided by Urban Crossroads, total trips assumed to be with only City Park land use, see assumptions file

Fleet Mix - See fleet mix adjustment in assumptions file

Area Coating - See assumptions file

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Water And Wastewater - Exckyde indoor water use as City Park Buildings will not be modified, only outdoor water use is accounted for, assume 100% aerobic treatment, see assumptions file

Solid Waste - CalEEMod appendix D, see assumptions file

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Parking	10952	4800
tblFleetMix	HHD	4.8550e-003	9.7100e-004
tblFleetMix	LDA	0.54	0.65
tblFleetMix	LDT1	0.06	0.07
tblFleetMix	LDT2	0.19	0.22
tblFleetMix	LHD1	0.02	4.8760e-003
tblFleetMix	LHD2	6.5220e-003	1.3040e-003
tblFleetMix	MCY	0.02	0.03
tblFleetMix	MDV	0.13	0.02
tblFleetMix	MH	3.9420e-003	0.00
tblFleetMix	MHD	0.01	2.8480e-003
tblFleetMix	OBUS	6.5600e-004	0.00
tblFleetMix	SBUS	7.2300e-004	0.00
tblFleetMix	UBUS	3.8500e-004	0.00
tblLandUse	LandUseSquareFeet	38,590.00	38,586.00
tblLandUse	LandUseSquareFeet	63,960.00	63,956.00
tblLandUse	LandUseSquareFeet	80,000.00	79,996.00
tblLandUse	LandUseSquareFeet	653,835.60	653,826.00
tblLandUse	LandUseSquareFeet	2,600.00	2,602.00
tblProjectCharacteristics	CO2IntensityFactor	390.98	509.98
tblSolidWaste	SolidWasteGenerationRate	1.29	1.73
tblSolidWaste	SolidWasteGenerationRate	14.82	0.00
tblVehicleTrips	DV_TP	28.00	0.00
tblVehicleTrips	PB_TP	6.00	0.00

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblVehicleTrips	PR_TP	66.00	100.00
tblVehicleTrips	ST_TR	1.96	95.14
tblVehicleTrips	ST_TR	21.35	0.00
tblVehicleTrips	SU_TR	2.19	95.14
tblVehicleTrips	SU_TR	17.40	0.00
tblVehicleTrips	WD_TR	0.78	47.57
tblVehicleTrips	WD_TR	14.03	0.00
tblWater	AerobicPercent	87.46	100.00
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	0.00
tblWater	IndoorWaterUseRate	153,772.17	0.00
tblWater	OutdoorWaterUseRate	17,884,135.06	15,145,554.00
tblWater	OutdoorWaterUseRate	94,247.46	0.00
tblWater	SepticTankPercent	10.33	0.00

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1645	1.9000e-004	0.0204	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0438	0.0438	1.1000e-004		0.0467
Energy	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
Mobile	4.9216	3.1439	49.7946	0.0977	11.7285	0.0611	11.7896	3.1077	0.0564	3.1641		10,002.3135	10,002.3135	0.6282	0.3088	10,110.0339
Total	**5.0876**	**3.1586**	**49.8272**	**0.0978**	**11.7285**	**0.0623**	**11.7908**	**3.1077**	**0.0576**	**3.1653**		**10,019.7683**	**10,019.7683**	**0.6286**	**0.3091**	**10,127.5950**

Mitigated Operational

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1645	1.9000e-004	0.0204	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0438	0.0438	1.1000e-004		0.0467
Energy	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
Mobile	4.9216	3.1439	49.7946	0.0977	11.7285	0.0611	11.7896	3.1077	0.0564	3.1641		10,002.3135	10,002.3135	0.6282	0.3088	10,110.0339
Total	**5.0876**	**3.1586**	**49.8272**	**0.0978**	**11.7285**	**0.0623**	**11.7908**	**3.1077**	**0.0576**	**3.1653**		**10,019.7683**	**10,019.7683**	**0.6286**	**0.3091**	**10,127.5950**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	4.9216	3.1439	49.7946	0.0977	11.7285	0.0611	11.7896	3.1077	0.0564	3.1641		10,002.3135	10,002.3135	0.6282	0.3088	10,110.0339
Unmitigated	4.9216	3.1439	49.7946	0.0977	11.7285	0.0611	11.7896	3.1077	0.0564	3.1641		10,002.3135	10,002.3135	0.6282	0.3088	10,110.0339

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	714.03	1,428.05	1428.05	3,615,989	3,615,989
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Racquet Club	0.00	0.00	0.00		
Total	714.03	1,428.05	1,428.05	3,615,989	3,615,989

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	16.60	8.40	6.90	33.00	48.00	19.00	100	0	0
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Racquet Club	16.60	8.40	6.90	11.50	69.50	19.00	52	39	9

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.646291	0.069827	0.221723	0.020000	0.004876	0.001304	0.002848	0.000971	0.000000	0.000000	0.032159	0.000000	0.000000
Other Asphalt Surfaces	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942
Other Non-Asphalt Surfaces	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942
Parking Lot	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942
Racquet Club	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
NaturalGas Unmitigated	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Racquet Club	147.993	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
Total		**1.6000e-003**	**0.0145**	**0.0122**	**9.0000e-005**		**1.1000e-003**	**1.1000e-003**		**1.1000e-003**	**1.1000e-003**		**17.4110**	**17.4110**	**3.3000e-004**	**3.2000e-004**	**17.5144**

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Racquet Club	0.147993	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
Total		**1.6000e-003**	**0.0145**	**0.0122**	**9.0000e-005**		**1.1000e-003**	**1.1000e-003**		**1.1000e-003**	**1.1000e-003**		**17.4110**	**17.4110**	**3.3000e-004**	**3.2000e-004**	**17.5144**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.1645	1.9000e-004	0.0204	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0438	0.0438	1.1000e-004		0.0467
Unmitigated	0.1645	1.9000e-004	0.0204	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0438	0.0438	1.1000e-004		0.0467

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0127					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1499					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.8900e-003	1.9000e-004	0.0204	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0438	0.0438	1.1000e-004		0.0467
Total	**0.1645**	**1.9000e-004**	**0.0204**	**0.0000**		**7.0000e-005**	**7.0000e-005**		**7.0000e-005**	**7.0000e-005**		**0.0438**	**0.0438**	**1.1000e-004**		**0.0467**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0127					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1499					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.8900e-003	1.9000e-004	0.0204	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0438	0.0438	1.1000e-004		0.0467
Total	**0.1645**	**1.9000e-004**	**0.0204**	**0.0000**		**7.0000e-005**	**7.0000e-005**		**7.0000e-005**	**7.0000e-005**		**0.0438**	**0.0438**	**1.1000e-004**		**0.0467**

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Summer

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Oak Creek Community Park Expansion & Improvement Plan, Project Operations

Orange County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	38.59	1000sqft	0.89	38,586.00	0
Other Non-Asphalt Surfaces	63.96	1000sqft	1.47	63,956.00	0
Parking Lot	80.00	1000sqft	1.84	79,996.00	0
City Park	15.01	Acre	15.01	653,826.00	0
Racquet Club	2.60	1000sqft	0.06	2,602.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	30
Climate Zone	8			**Operational Year**	2023
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	509.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Based on 2020 Sustainability Report.

Land Use - Based on applicant info., see assumptions file

Construction Phase -

Vehicle Trips - Assume double trip generation on weekends compared to weekday, trip analysis provided by Urban Crossroads, total trips assumed to be with only City Park land use, see assumptions file

Fleet Mix - See fleet mix adjustment in assumptions file

Area Coating - See assumptions file

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Water And Wastewater - Exckyde indoor water use as City Park Buildings will not be modified, only outdoor water use is accounted for, assume 100% aerobic treatment, see assumptions file

Solid Waste - CalEEMod appendix D, see assumptions file

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Parking	10952	4800
tblFleetMix	HHD	4.8550e-003	9.7100e-004
tblFleetMix	LDA	0.54	0.65
tblFleetMix	LDT1	0.06	0.07
tblFleetMix	LDT2	0.19	0.22
tblFleetMix	LHD1	0.02	4.8760e-003
tblFleetMix	LHD2	6.5220e-003	1.3040e-003
tblFleetMix	MCY	0.02	0.03
tblFleetMix	MDV	0.13	0.02
tblFleetMix	MH	3.9420e-003	0.00
tblFleetMix	MHD	0.01	2.8480e-003
tblFleetMix	OBUS	6.5600e-004	0.00
tblFleetMix	SBUS	7.2300e-004	0.00
tblFleetMix	UBUS	3.8500e-004	0.00
tblLandUse	LandUseSquareFeet	38,590.00	38,586.00
tblLandUse	LandUseSquareFeet	63,960.00	63,956.00
tblLandUse	LandUseSquareFeet	80,000.00	79,996.00
tblLandUse	LandUseSquareFeet	653,835.60	653,826.00
tblLandUse	LandUseSquareFeet	2,600.00	2,602.00
tblProjectCharacteristics	CO2IntensityFactor	390.98	509.98
tblSolidWaste	SolidWasteGenerationRate	1.29	1.73
tblSolidWaste	SolidWasteGenerationRate	14.82	0.00
tblVehicleTrips	DV_TP	28.00	0.00
tblVehicleTrips	PB_TP	6.00	0.00

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblVehicleTrips	PR_TP	66.00	100.00
tblVehicleTrips	ST_TR	1.96	95.14
tblVehicleTrips	ST_TR	21.35	0.00
tblVehicleTrips	SU_TR	2.19	95.14
tblVehicleTrips	SU_TR	17.40	0.00
tblVehicleTrips	WD_TR	0.78	47.57
tblVehicleTrips	WD_TR	14.03	0.00
tblWater	AerobicPercent	87.46	100.00
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	0.00
tblWater	IndoorWaterUseRate	153,772.17	0.00
tblWater	OutdoorWaterUseRate	17,884,135.06	15,145,554.00
tblWater	OutdoorWaterUseRate	94,247.46	0.00
tblWater	SepticTankPercent	10.33	0.00

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1645	1.9000e-004	0.0204	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0438	0.0438	1.1000e-004		0.0467
Energy	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
Mobile	4.9168	3.4418	49.1508	0.0932	11.7285	0.0611	11.7896	3.1077	0.0564	3.1641		9,544.7298	9,544.7298	0.6488	0.3272	9,658.4674
Total	**5.0829**	**3.4565**	**49.1834**	**0.0933**	**11.7285**	**0.0623**	**11.7908**	**3.1077**	**0.0576**	**3.1653**		**9,562.1845**	**9,562.1845**	**0.6492**	**0.3276**	**9,676.0285**

Mitigated Operational

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.1645	1.9000e-004	0.0204	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0438	0.0438	1.1000e-004		0.0467
Energy	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
Mobile	4.9168	3.4418	49.1508	0.0932	11.7285	0.0611	11.7896	3.1077	0.0564	3.1641		9,544.7298	9,544.7298	0.6488	0.3272	9,658.4674
Total	**5.0829**	**3.4565**	**49.1834**	**0.0933**	**11.7285**	**0.0623**	**11.7908**	**3.1077**	**0.0576**	**3.1653**		**9,562.1845**	**9,562.1845**	**0.6492**	**0.3276**	**9,676.0285**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	4.9168	3.4418	49.1508	0.0932	11.7285	0.0611	11.7896	3.1077	0.0564	3.1641		9,544.7298	9,544.7298	0.6488	0.3272	9,658.4674
Unmitigated	4.9168	3.4418	49.1508	0.0932	11.7285	0.0611	11.7896	3.1077	0.0564	3.1641		9,544.7298	9,544.7298	0.6488	0.3272	9,658.4674

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	714.03	1,428.05	1428.05	3,615,989	3,615,989
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Racquet Club	0.00	0.00	0.00		
Total	714.03	1,428.05	1,428.05	3,615,989	3,615,989

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	16.60	8.40	6.90	33.00	48.00	19.00	100	0	0
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Racquet Club	16.60	8.40	6.90	11.50	69.50	19.00	52	39	9

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.646291	0.069827	0.221723	0.020000	0.004876	0.001304	0.002848	0.000971	0.000000	0.000000	0.032159	0.000000	0.000000
Other Asphalt Surfaces	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942
Other Non-Asphalt Surfaces	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942
Parking Lot	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942
Racquet Club	0.544795	0.058861	0.186903	0.129401	0.024381	0.006522	0.014242	0.004855	0.000656	0.000385	0.024332	0.000723	0.003942

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
NaturalGas Unmitigated	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Racquet Club	147.993	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
Total		**1.6000e-003**	**0.0145**	**0.0122**	**9.0000e-005**		**1.1000e-003**	**1.1000e-003**		**1.1000e-003**	**1.1000e-003**		**17.4110**	**17.4110**	**3.3000e-004**	**3.2000e-004**	**17.5144**

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Racquet Club	0.147993	1.6000e-003	0.0145	0.0122	9.0000e-005		1.1000e-003	1.1000e-003		1.1000e-003	1.1000e-003		17.4110	17.4110	3.3000e-004	3.2000e-004	17.5144
Total		**1.6000e-003**	**0.0145**	**0.0122**	**9.0000e-005**		**1.1000e-003**	**1.1000e-003**		**1.1000e-003**	**1.1000e-003**		**17.4110**	**17.4110**	**3.3000e-004**	**3.2000e-004**	**17.5144**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.1645	1.9000e-004	0.0204	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0438	0.0438	1.1000e-004		0.0467
Unmitigated	0.1645	1.9000e-004	0.0204	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0438	0.0438	1.1000e-004		0.0467

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0127					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1499					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.8900e-003	1.9000e-004	0.0204	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0438	0.0438	1.1000e-004		0.0467
Total	**0.1645**	**1.9000e-004**	**0.0204**	**0.0000**		**7.0000e-005**	**7.0000e-005**		**7.0000e-005**	**7.0000e-005**		**0.0438**	**0.0438**	**1.1000e-004**		**0.0467**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0127					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.1499					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.8900e-003	1.9000e-004	0.0204	0.0000		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005		0.0438	0.0438	1.1000e-004		0.0467
Total	**0.1645**	**1.9000e-004**	**0.0204**	**0.0000**		**7.0000e-005**	**7.0000e-005**		**7.0000e-005**	**7.0000e-005**		**0.0438**	**0.0438**	**1.1000e-004**		**0.0467**

7.0 Water Detail

Oak Creek Community Park Expansion & Improvement Plan, Project Operations - Orange County, Winter

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

LST Worksheets

Construction Localized Significance Thresholds: Asphalt Demolition, Site Preparation

		NOx & CO		*PM10 & PM2.5*		
SRA No.	Acres	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Construction / Project Site Size (Acres)
19	4.5	46	150	46	150	11.42

Source Receptor	**Saddleback Valley**	**Equipment**	**Acres/8-hr Day**		**Daily hours**	**Equipment Used**	**Acres**
Distance (meters)	46	Tractors	0.5	0.0625	8	4	2
NOx	**180**	Graders	0.5	0.0625			0
CO	**1,907**	Dozers	0.5	0.0625	8	5	2.5
PM10	**29.92**	Scrapers	1	0.125			0
PM2.5	**9.68**					**Acres**	4.50

	Acres	**25**	**50**	**100**	**200**	**500**
NOx	4	175	168	180	203	263
	5	197	189	201	222	278
		186	179	191	213	271
CO	4	1534	1810	2407	3913	9823
	5	1804	2102	2763	4387	10507
		1669	1956	2585	4150	10165
PM10	4	10	31	43	68	142
	5	12	37	49	74	148
		11	34	46	71	145
PM2.5	4	7	9	14	27	85
	5	8	11	16	30	90
		7	10	15	29	87

Saddleback Valley

4.50 Acres

	25	**50**	**100**	**200**	**500**
NOx	186	179	191	213	271
CO	1669	1956	2585	4150	10165
PM10	11	34	46	71	145
PM2.5	7	10	15	29	87

Acre Below		**Acre Above**	
SRA No.	Acres	SRA No.	Acres
19	4	19	5
Distance Increment Below			
25			
Distance Increment Above			
50			

Updated: 10/21/2009 - Table C-1. 2006 – 2008

Construction Localized Significance Thresholds: Asphalt Demolition and Debris Haul, Site Preparation

		NOx & CO		*PM10 & PM2.5*		
SRA No.	Acres	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Construction / Project Site Size (Acres)
19	4.5	46	150	46	150	11.42

Source Receptor	**Saddleback Valley**	**Equipment**	**Acres/8-hr Day**		**Daily hours**	**Equipment Used**	**Acres**
Distance (meters)	46	Tractors	0.5	0.0625	8	4	2
NOx	**180**	Graders	0.5	0.0625			0
CO	**1,907**	Dozers	0.5	0.0625	8	5	2.5
PM10	**29.92**	Scrapers	1	0.125			0
PM2.5	**9.68**					**Acres**	4.50

	Acres	**25**	**50**	**100**	**200**	**500**
NOx	4	175	168	180	203	263
	5	197	189	201	222	278
		186	179	191	213	271
CO	4	1534	1810	2407	3913	9823
	5	1804	2102	2763	4387	10507
		1669	1956	2585	4150	10165
PM10	4	10	31	43	68	142
	5	12	37	49	74	148
		11	34	46	71	145
PM2.5	4	7	9	14	27	85
	5	8	11	16	30	90
		7	10	15	29	87

Saddleback Valley

4.50 Acres

	25	**50**	**100**	**200**	**500**
NOx	186	179	191	213	271
CO	1669	1956	2585	4150	10165
PM10	11	34	46	71	145
PM2.5	7	10	15	29	87

Acre Below		**Acre Above**	
SRA No.	Acres	SRA No.	Acres
19	4	19	5
Distance Increment Below			
25			
Distance Increment Above			
50			

Updated: 10/21/2009 - Table C-1. 2006 – 2008

Construction Localized Significance Thresholds: Site Preparation, Rough Grading, Utilities Trenching

		NOx & CO		*PM10 & PM2.5*		
SRA No.	Acres	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Construction / Project Site Size (Acres)
19	5.0	46	150	46	150	11.42

Source Receptor	**Saddleback Valley**	**Equipment**	**Acres/8-hr Day**		**Daily hours**	**Equipment Used**	**Acres**
Distance (meters)	46	Tractors	0.5	0.0625	8	6	3
NOx	**190**	Graders	0.5	0.0625	8	1	0.5
CO	**2,051**	Dozers	0.5	0.0625	8	4	2
PM10	**32.72**	Scrapers	1	0.125	8	2	2
PM2.5	**10.49**					**Acres**	7.50

	Acres	**25**	**50**	**100**	**200**	**500**
NOx	5	197	189	201	222	278
	5	197	189	201	222	278
		197	189	201	222	278
CO	5	1804	2102	2763	4387	10507
	5	1804	2102	2763	4387	10507
		1804	2102	2763	4387	10507
PM10	5	12	37	49	74	148
	5	12	37	49	74	148
		12	37	49	74	148
PM2.5	5	8	11	16	30	90
	5	8	11	16	30	90
		8	11	16	30	90

Saddleback Valley

5.00 Acres

	25	**50**	**100**	**200**	**500**
NOx	197	189	201	222	278
CO	1804	2102	2763	4387	10507
PM10	12	37	49	74	148
PM2.5	8	11	16	30	90

Acre Below		**Acre Above**	
SRA No.	Acres	SRA No.	Acres
19	5	19	5
Distance Increment Below			
25			
Distance Increment Above			
50			

Updated: 10/21/2009 - Table C-1. 2006 – 2008

Construction Localized Significance Thresholds: Fine Grading and Finishing/Landscaping 2022

		NOx & CO		*PM10 & PM2.5*		
SRA No.	Acres	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Construction / Project Site Size (Acres)
19	4	46	150	46	150	11.42

Source Receptor	**Saddleback Valley**	**Equipment**	**Acres/8-hr Day**		**Daily hours**	**Equipment Used**	**Acres**
Distance (meters)	46	Tractors	0.5	0.0625	8	2	1
NOx	**169**	Graders	0.5	0.0625	8	1	0.5
CO	**1,763**	Dozers	0.5	0.0625	8	1	0.5
PM10	**27.13**	Scrapers	1	0.125	8	2	2
PM2.5	**8.88**					**Acres**	4.00

	Acres	**25**	**50**	**100**	**200**	**500**
NOx	4	175	168	180	203	263
	4	175	168	180	203	263
		175	168	180	203	263
CO	4	1534	1810	2407	3913	9823
	4	1534	1810	2407	3913	9823
		1534	1810	2407	3913	9823
PM10	4	10	31	43	68	142
	4	10	31	43	68	142
		10	31	43	68	142
PM2.5	4	7	9	14	27	85
	4	7	9	14	27	85
		7	9	14	27	85

Saddleback Valley

4.00 Acres

	25	**50**	**100**	**200**	**500**
NOx	175	168	180	203	263
CO	1534	1810	2407	3913	9823
PM10	10	31	43	68	142
PM2.5	7	9	14	27	85

Acre Below		**Acre Above**	
SRA No.	Acres	SRA No.	Acres
19	4	19	4
Distance Increment Below			
25			
Distance Increment Above			
50			

Updated: 10/21/2009 - Table C-1. 2006 – 2008

Construction Localized Significance Thresholds: Fine Grading, Paving, and Finishing/Landscaping 2022

		NOx & CO		*PM10 & PM2.5*		
SRA No.	Acres	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Construction / Project Site Size (Acres)
19	4.0	46	150	46	150	11.42

Source Receptor	**Saddleback Valley**	**Equipment**	**Acres/8-hr Day**		**Daily hours**	**Equipment Used**	**Acres**
Distance (meters)	46	Tractors	0.5	0.0625	8	2	1
NOx	**169**	Graders	0.5	0.0625	8	1	0.5
CO	**1,763**	Dozers	0.5	0.0625	8	1	0.5
PM10	**27.13**	Scrapers	1	0.125	8	2	2
PM2.5	**8.88**					**Acres**	4.00

	Acres	**25**	**50**	**100**	**200**	**500**
NOx	4	175	168	180	203	263
	4	175	168	180	203	263
		175	168	180	203	263
CO	4	1534	1810	2407	3913	9823
	4	1534	1810	2407	3913	9823
		1534	1810	2407	3913	9823
PM10	4	10	31	43	68	142
	4	10	31	43	68	142
		10	31	43	68	142
PM2.5	4	7	9	14	27	85
	4	7	9	14	27	85
		7	9	14	27	85

Saddleback Valley

4.00 Acres

	25	**50**	**100**	**200**	**500**
NOx	175	168	180	203	263
CO	1534	1810	2407	3913	9823
PM10	10	31	43	68	142
PM2.5	7	9	14	27	85

Acre Below		**Acre Above**	
SRA No.	Acres	SRA No.	Acres
19	4	19	4
Distance Increment Below			
25			
Distance Increment Above			
50			

Updated: 10/21/2009 - Table C-1. 2006 – 2008

Construction Localized Significance Thresholds: Asphalt Paving and Finishing/Landscaping 2022

		NOx & CO		*PM10 & PM2.5*		
SRA No.	Acres	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Construction / Project Site Size (Acres)
19	0	46	150	46	150	11.42

Source Receptor	**Saddleback Valley**	**Equipment**	**Acres/8-hr Day**		**Daily hours**	**Equipment Used**	**Acres**
Distance (meters)	46	Tractors	0.5	0.0625			0
NOx	**93**	Graders	0.5	0.0625			0
CO	**810**	Dozers	0.5	0.0625			0
PM10	**9.80**	Scrapers	1	0.125			0
PM2.5	**3.83**					**Acres**	0.00

	Acres	**25**	**50**	**100**	**200**	**500**
NOx	1	91	93	108	140	218
	1	91	93	108	140	218
		91	93	108	140	218
CO	1	696	833	1234	2376	7724
	1	696	833	1234	2376	7724
		696	833	1234	2376	7724
PM10	1	4	11	24	48	121
	1	4	11	24	48	121
		4	11	24	48	121
PM2.5	1	3	4	8	19	68
	1	3	4	8	19	68
		3	4	8	19	68

Saddleback Valley

0.00 Acres

	25	**50**	**100**	**200**	**500**
NOx	91	93	108	140	218
CO	696	833	1234	2376	7724
PM10	4	11	24	48	121
PM2.5	3	4	8	19	68

Acre Below		**Acre Above**	
SRA No.	Acres	SRA No.	Acres
19	1	19	1
Distance Increment Below			
25			
Distance Increment Above			
50			

Updated: 10/21/2009 - Table C-1. 2006 – 2008

Appendix B Cultural Resources Assessment

Appendix

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CULTURAL RESOURCES ASSESSMENT

Oak Creek Community Park Expansion and Improvement Project

Irvine, Orange County, California

Prepared for:

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Placeworks
3 MacArthur Place, Suite 1100
Santa Ana, California 92707

Prepared by:

David Brunzell, M.A., RPA
BCR Consulting
505 West 8th Street
Claremont, California 91711

Project No. PWK2103

National Archaeological Data Base Information:
Type of Study: Reconnaissance Survey
Resources Recorded: None
Keywords: Dana Point
USGS Quadrangles: 7.5-minute *Tustin, California* (1965)

BCRCONSULTING LLC

May 27, 2022

MANAGEMENT SUMMARY

BCR Consulting LLC (BCR Consulting) is under contract to Placeworks to conduct a Cultural Resources Assessment of the Oak Creek Community Park Expansion and Improvement Project (the project) located in the City of Irvine (City), Orange County, California. Tasks completed for the scope of work include a cultural resources records search, an intensive-level pedestrian cultural resources survey, Sacred Lands File search with the Native American Heritage Commission, and paleontological overview. These tasks were performed in partial fulfillment of California Environmental Quality Act (CEQA) requirements. The archaeological records search was conducted at the South Central Coastal Information Center (SCCIC) at California State University, Fullerton. This research has revealed that 44 resource studies have taken place resulting in the recording of three cultural resources (two prehistoric and one historic-period) within one half-mile of the project site. None of the previous studies have assessed the project site and no cultural resources were identified within the project boundaries.

During the field survey, BCR Consulting archaeologists did not identify any cultural resources within the project boundaries. Due to a lack of cultural resources located within the project site, BCR Consulting recommends that no additional cultural resources work or monitoring is necessary for any proposed project activities. However, if previously undocumented cultural resources are identified during earthmoving activities, a qualified archaeologist shall be contacted to assess the nature and significance of the find, diverting construction excavation if necessary.

Findings were positive during the Sacred Lands File search with the NAHC. The City will initiate Assembly Bill (AB) 52 Native American Consultation for the project. Since the city will initiate and carry out the required Native American Consultation, the results of the consultation are not provided in this report. However, this report may be used during the consultation process, and BCR Consulting staff is available to answer questions and address concerns as necessary.

According to CEQA Guidelines, projects subject to CEQA must determine whether the project would “directly or indirectly destroy a unique paleontological resource”. The appended Paleontological Overview provided in Appendix B has recommended that:

> The geologic units underlying the project area are mapped entirely as young alluvial fan deposits dating from the late Pleistocene to Holocene epoch (Morton & Miller, 2006). Pleistocene alluvial units are considered to be of high paleontological sensitivity, and while the Western Science Center does not have localities within the project area or a one-mile radius, we do have multiple localities in similarly mapped units throughout the region. Pleistocene alluvial units are known to produce fossil specimens including those associated with mastodon (Mammut pacificus), mammoth (Mammuthus columbi), ancient horse (Equus sp.), camel (Camelops hesternus), sabertooth cats (Smilodon fatalis) and many more.
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> Any fossil specimens recovered from the Oak Creek Community Park Project would be scientifically significant. Excavation activity associated with the development of the project area would impact the paleontologically sensitive Pleistocene units, and

it is the recommendation of the Western Science Center that a paleontological resource mitigation program be put in place to monitor, salvage, and curate any recovered fossils from the study area.

If human remains are encountered during the undertaking, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. The County Coroner must be notified of the find immediately. If the remains are determined to be prehistoric, the Coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a Most Likely Descendant (MLD). With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD shall complete the inspection within 48 hours of notification by the NAHC.

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INTRODUCTION

BCR Consulting LLC (BCR Consulting) is under contract to Placeworks to conduct a Cultural Resources Assessment of the Oak Creek Community Park Expansion and Improvement Project (the project) located in the City of Irvine (City), Orange County, California. An intensive-level pedestrian cultural resources survey of the project site was completed in partial fulfillment of California Environmental Quality Act (CEQA) requirements. The project site is located in non-sectioned Township 6 South, Range 9 West, San Bernardino Baseline and Meridian, as depicted on the United States Geological Survey (USGS) *Tustin, California* (1965) 7.5-minute topographic quadrangle (Figure 1).

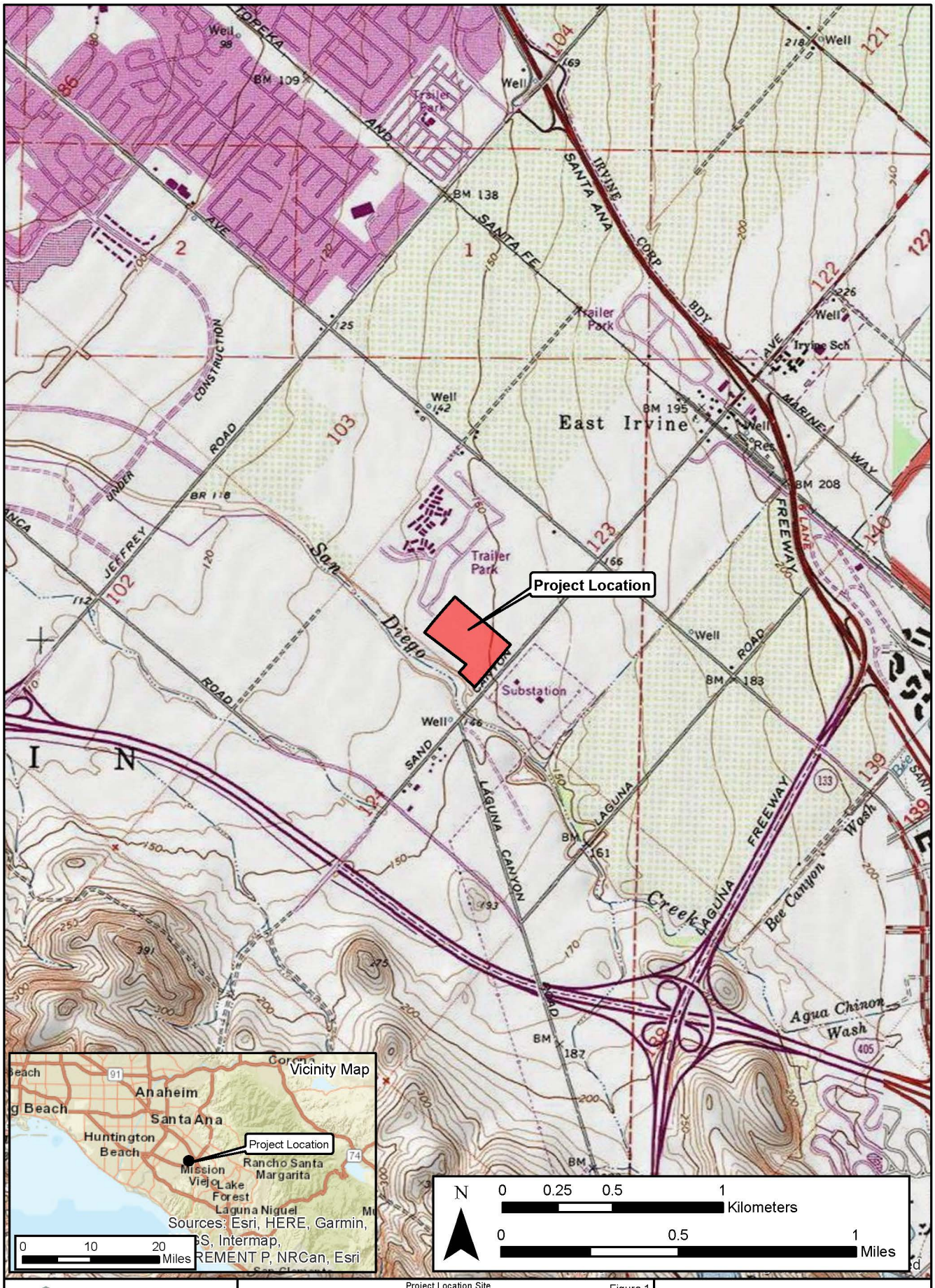
Regulatory Setting

The California Environmental Quality Act. CEQA applies to all discretionary projects undertaken or subject to approval by the state's public agencies (California Code of Regulations 14(3), § 15002(i)). Under CEQA, "A project with an effect that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment" (Cal. Code Regs. tit. 14(3), § 15064.5(b)). State CEQA Guidelines section 15064.5(a) defines a "historical resource" as a resource that meets one or more of the following criteria:

- Listed in, or eligible for listing in, the California Register of Historical Resources (California Register)
- Listed in a local register of historical resources (as defined at Cal. Public Res. Code § 5020.1(k))
- Identified as significant in a historical resource survey meeting the requirements of § 5024.1(g) of the Cal. Public Res. Code
- Determined to be a historical resource by a project's lead agency (Cal. Code Regs. tit. 14(3), § 15064.5(a))

A historical resource consists of "Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California…Generally, a resource shall be considered by the lead agency to be 'historically significant' if the resource meets the criteria for listing in the California Register of Historical Resources" (Cal. Code Regs. tit. 14(3), § 15064.5(a)(3)). The significance of a historical resource is impaired when a project demolishes or materially alters in an adverse manner those physical characteristics of a historical resource that convey its historical significance and that justify its eligibility for the California Register. If an impact on a historical or archaeological resource is significant, CEQA requires feasible measures to minimize the impact (State CEQA Guidelines § 15126.4 (a)(1)). Mitigation of significant impacts must lessen or eliminate the physical impact that the project will have on the resource.

Section 5024.1 of the Cal. Public Res. Code established the California Register. Generally, a resource is considered by the lead agency to be "historically significant" if the resource meets the criteria for listing in the California Register (Cal. Code Regs. tit. 14(3), § 15064.5(a)(3)). The eligibility criteria for the California Register are similar to those of the National



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Project Location Site
Oak Creek Community Park
Expansion and Improvement Project
Reference: ESRI; USGS Quad: Tustin (1965), California

Figure 1

Placeworks

National Register of Historic Places (National Register), and a resource that meets one of more of the eligibility criteria of the National Register will be eligible for the California Register. The California Register program encourages public recognition and protection of resources of architectural, historical, archaeological, and cultural significance, identifies historical resources for planning purposes, determines eligibility for state historic preservation grant funding and affords certain protections under CEQA. Criteria for Designation:

1. Associated with events that have made a significant contribution to the broad patterns of local or regional history or the cultural heritage of California or the United States.
2. Associated with the lives of persons important to local, California or national history.
3. Embodies the distinctive characteristics of a type, period, region or method of construction or represents the work of a master or possesses high artistic values.
4. Has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California or the nation.

In addition to meeting one or more of the above criteria, the California Register requires that sufficient time has passed since a resource's period of significance to "obtain a scholarly perspective on the events or individuals associated with the resources." (CCR 4852 [d][2]). Fifty years is normally considered sufficient time for a potential historical resource, and in order that the evaluation remain valid for a minimum of five years after the date of this report, all resources older than 45 years (i.e. resources from the "historic-period") will be evaluated for California Register listing eligibility, or CEQA significance. The California Register also requires that a resource possess integrity. This is defined as the ability for the resource to convey its significance through seven aspects: location, setting, design, materials, workmanship, feeling, and association.

Assembly Bill 52. California Assembly Bill 52 was approved on September 25, 2014. As stated in Section 11 of AB 52, the act applies only to projects that have a notice of preparation or a notice of negative declaration or mitigated negative declaration filed on or after July 1, 2015. AB 52 establishes "tribal cultural resources" (TCRs) as a new category of resources under CEQA. As defined under Public Resources Code Section 21074, TCRs are "sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American Tribe" that are either: (1) included or determined to be eligible for inclusion in the CRHR; included in a local register of historical resources as defined in Public Resources Code Section 5020.1(k); or (2) determined by the lead agency to be significant pursuant to the criteria for inclusion in the CRHR set forth in Public Resources Code Section 5024.1(c), if supported by substantial evidence and taking into account the significance of the resource to a California Native American tribe. A "historical resource" as defined in Public Resources Code Section 21084.1, a "unique archaeological resource" as defined in Public Resources Code Section 21083.2(g), or a "nonunique archaeological resource" as defined in Public Resources Code Section 21083.2(h) may also be TCRs. AB 52 further establishes a new consultation process with California Native American tribes for proposed projects in geographic areas that are traditionally and culturally affiliated with that tribe. Per Public Resources Code Section 21073, "California Native American tribe" includes federally and non-federally recognized tribes on the NAHC contact list. Subject to certain prerequisites, AB 52

requires, among other things, that a lead agency consult with the geographically affiliated tribe before the release of an environmental review document for a proposed project regarding project alternatives, recommended mitigation measures, or potential significant effects, if the tribe so requests in writing. If the tribe and the lead agency agree upon mitigation measures during their consultation, these mitigation measures must be recommended for inclusion in the environmental document (Public Resources Code Sections 21080.3.1, 21080.3.2, 21082.3, 21084.2, and 21084.3). Since the City will initiate and carry out the required AB52 Native American Consultation, the results of the consultation are not provided in this report. However, this report may be used during the consultation process, and BCR Consulting staff are available to answer questions and address comments as necessary.

Paleontological Resources. CEQA provides guidance relative to significant impacts on paleontological resources, indicating that a project would have a significant impact on paleontological resources if it disturbs or destroys a unique paleontological resource or site or unique geologic feature. Section 5097.5 of the California Public Resources Code specifies that any unauthorized removal of paleontological remains is a misdemeanor. Further, California Penal Code Section 622.5 sets the penalties for damage or removal of paleontological resources. CEQA documentation prepared for projects would be required to analyze paleontological resources as a condition of the CEQA process to disclose potential impacts. Please note that as of January 2018 paleontological resources are considered in the geological rather than cultural category. Therefore, paleontological resources are not summarized in the body of this report. A paleontological overview completed by professional paleontologists from the Western Science Center is provided as Appendix D.

NATURAL SETTING

The area is derived from several geological units including younger alluvial flood plain deposits, Holocene landslide deposits, and Pliocene Capistrano Formation (Tan 1999). The project site is located in Laguna Canyon adjacent to the small peninsular range known as the Santa Ana Mountains, on the southern extent of the physiographic area known as the Los Angeles Basin. It is characterized as a transverse-oriented lowland basin and coastal plain. The basin originated as a deep marine trough during the Pliocene (7-2 million years ago) that eventually filled with shallow water fossil bearing sediments. By the beginning of the Pleistocene (after 2 million years ago) uplifting created the series of plains and mesas along the coast that now characterize the area (Lambert 1994, Mendenhall 1905, Woodford et al. 1954). The project site has been highly disturbed by existing road and residential developments in addition to utility installation and landscaping associated with a local school. Soils reports were not available to indicate the exact depth of previous disturbance, but typical depths of disturbance for such developments are between two and five feet beneath the surface. Local rainfall ranges from 5 to 15 inches annually (Jaeger and Smith 1971: 36-37). Historically, regional flora was dominated by chaparral, coastal sage scrub, and riparian vegetation communities, although local urban and agricultural developments have severely reduced their modern proliferation. Key native plants included black sage, California brittlebush, California buckwheat, California sagebrush, deerweed, golden yarrow, laurel sumac, lemonadeberry, poison oak, purple sage, sticky monkeyflower, sugar bush, toyon, white sage, coastal century plant, coastal cholla, prickly-pear cactus, arroyo willow, and bulrush. These plants were utilized by local animal species, which included kangaroo rats, California horned lizard, orange-throated whiptail, San Diego horned lizard, brown-headed

cowbird, California gnatcatcher, California quail, cactus wren, darkling beetle, harvester ant, and Palos Verdes blue butterfly (Williams et al. 2008:117,122). Peripheral species included deer, and various rodents, rabbits, and birds -many of which were utilized by prehistoric and historic inhabitants (Lightfoot and Parrish 2009).

CULTURAL SETTING

Prehistory

Various regional syntheses have been commonly utilized in the archaeological literature for southern California. The most widely cited include Wallace (1955) and Warren (1968 and 1986). Wallace defines four cultural horizons, each with characteristic local variations:

- Early Period (before 6000 B.C.)
- Milling Stone (6000 to 3000 B.C.)
- Intermediate (3000 B.C. to A.D. 500)
- Late Prehistoric (A.D. 500 to A.D. 1769).

Employing a more ecological model Warren (1968) defined three traditions, including:

- San Dieguito (pre 5500 B.C.)
- Encinitas (5500 B.C. to A.D. 600)
- Shoshonean (A.D. 600 to A.D. 1769).

Relying on data from more desert-based groups Warren defined five periods in his 1986 study:

- Lake Mojave (8000 to 5000 B.C.)
- Pinto (5000 to 2000 B.C.
- Gypsum (2000 B.C. to A.D. 500)
- Saratoga Springs (A.D. 500 to 1200)
- Protohistoric (A.D. 1200 to 1769).

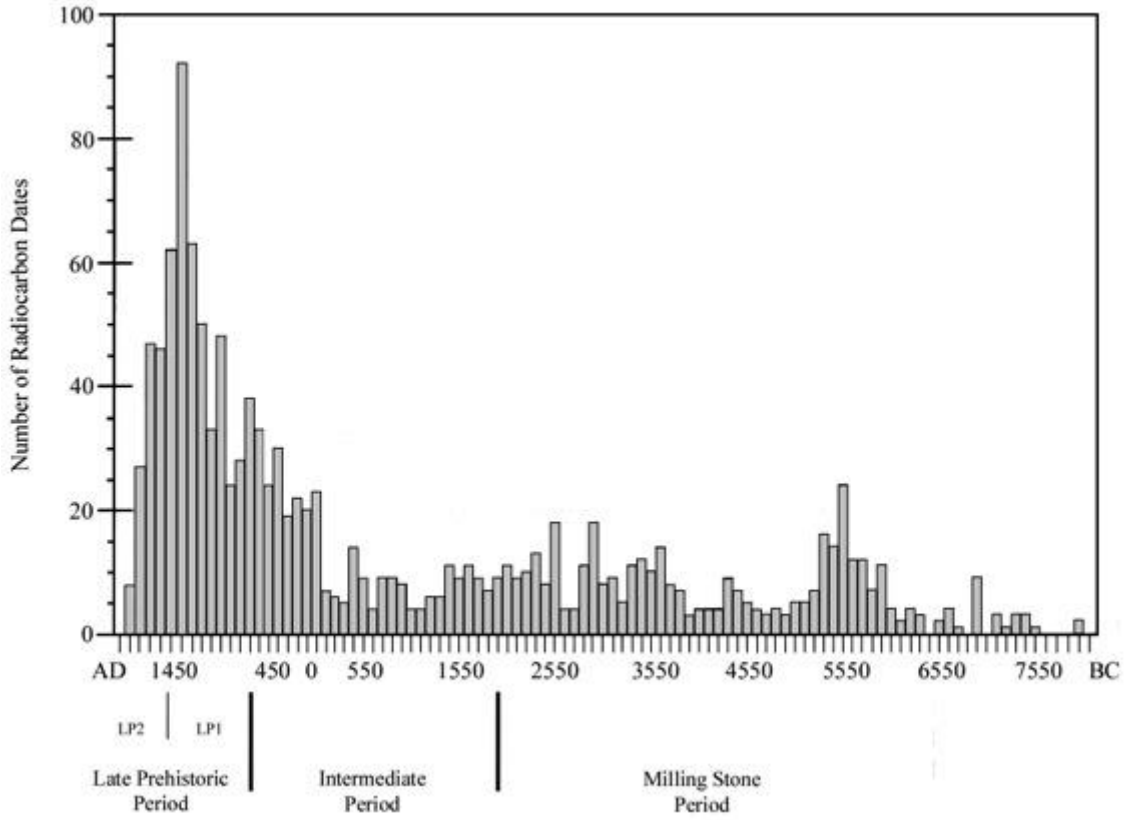
Although these references have provided useful overviews for southern California, updated studies more specific to the prehistory of coastal southern California (see Arnold 1990, 1991, 1992, 1995; Arnold et al. 1997; Raab and Larson 1997) are relevant to the current project area. The current study is synthesized from Mason et al. (1997), and Koerper et al. (2002). This regional focus is considered vital to Orange County prehistory because of the wealth of reliably dated prehistoric sites recorded in area, ranging from 7550 B.C. to the late Late Prehistoric (Mason et al. 1997:35; Koerper et al. 2002:68). A temporal scheme has been formulated from data utilized by both studies, and is provided below in Table A. Mason et al. (1997) combine data from six sites excavated during the Newport Coast Archaeological Project (NCAP) with climatic and biogeographical information collected within the greater Orange County area to address the importance of:

- terrestrial/marine vertebrates versus shell-fish/plant utilization by Millingstone populations
- significant population fluctuations during the Early to Middle Holocene

- settlement transition and other adaptive strategies at the end of the Middle Holocene
- issues of prehistoric lithic trade.

They conclude that Middle Holocene site expansion along the Orange County coast is the result of new habitats containing important food sources that flourished due to stabilizing sea levels between five and six thousand years ago (Mason et al. 1997:58). These habitats particularly included kelp beds containing sheephead fish, and sandy and muddy substrates that encouraged proliferation of cockles, scallops, oysters, bat rays, and guitar fish -each of which has been found in significant numbers during this era at sites within NCAP (Mason et al. 1997:40-41). During the late Holocene population increase resulting from access to these food sources and terrestrial resources allowed expansion into Orange County's interior.

Table A. Radiocarbon Dates/Periods from Sites in Orange County (Koerper et al. 2002:68)



As prehistoric populations spread throughout the Orange County area, their tool types and site remains indicate two settlement strategies. The first, known as the forager model, enabled whole groups to mobilize between residential bases as part of a seasonal round. This was commonly practiced during the Millingstone and early Intermediate Period. During the late Intermediate Period and the early Late Prehistoric Period, a functional hierarchy of site types appear, containing multi-season residential bases, minor residential bases, and single gender specialized activity locations. This indicates the second model, known as the collector (or village) model, in which residential bases remain the same or seasonal, while specialized procurement parties are deployed to collect resources and bring them back to base (Mason

et al. 1997:52, 56; see also Binford 1980, and Thomas 1983). In addition to site data, Koerper et al. (2002) utilize information from wetland salinity, climatic and hydrologic conditions, and artificial and natural resource depletion studies which link "demographic dynamics to subsistence intensification, territoriality, violent behavior, trade, and the further elaboration of status hierarchies during the late Holocene in Orange County" (Koerper et al. 2002:63). This approach has underscored the importance of punctuated environmental events, such as the capricious coursing of local drainage systems often catalyzed by the commencement and/or termination of droughts (i.e. the Medieval Climatic Anomaly and the Little Ice Age). Having occurred within relatively short time frames, these events are posited to give rise to a model of dramatic cultural shift rather than one of gradualism, and have been confirmed by correlating radiocarbon dates utilized in the local prehistoric chronology (Table A). Dramatic shift is particularly evident between ca. 2000 and 1000 B.C. when a decline in carbon-fourteen dates from the area indicated the disappearance of a population practicing a residential mobility pattern of foraging, the predominant adaptive strategy practiced during the mid-Holocene. The disappearance of this group is highly correlated with very dry conditions, as indicated by pollen studies (Koerper et al. 2002:79), and people do not reappear in this area in significant numbers until circa 1000 B.C., at which point fewer, more highly concentrated settlements appear. Some resource intensification is apparent during the ensuing generations, and by the beginning of the Late Prehistoric is confirmed by the expanding use of shellfish recovered in context as far as six kilometers from its origin at Newport Bay. Resource intensification is often a sign of a shortage of preferred or customary resources brought about by a rise in population and/or other factors. Such a rise in population certainly occurred by A.D. 600, peaking circa A.D. 1300 (see Table A), and is correlated with the local advent of the bow and arrow, which may have been brought by Takic speakers from the Southwest (Koerper et al. 2002:80).

Native Orange County populations began to decline during the late Late Prehistoric prior to any likely effects of European disease. Koerper et al. suggests that rather than exceeding the land's carrying capacity, this decline in the Orange County area was due to a failure of "food yields...to increase in proportion to the additional investments of energy expended in subsistence labor" (Koerper et al. 2002:80; see also Halstead and O'Shea 1989; Hayden 1990). This has been further supported by oral tradition, which suggests that people were driven to leave food procurement areas due to incongruities between population and resources (ibid), which gave rise to the patterns whose rudiments remained at the time of European contact.

Ethnography

Gabrielino. The Gabrielino probably first encountered Europeans when Spanish explorers reached California's southern coast during the 15th and 16th centuries (Bean and Smith 1978; Kroeber 1925). The first documented encounter, however, occurred in 1769 when Gaspar de Portola's expedition crossed Gabrielino territory (Bean and Smith 1978). Other brief encounters took place over the years, and are documented in McCawley 1996 (citing numerous sources). The Gabrielino name has been attributed by association with the Spanish mission of San Gabriel, and refers to a subset of people sharing speech and customs with other Cupan speakers (such as the Juaneño/Luiseño/Ajachemem) from the greater Takic branch of the Uto-Aztecan language family (Bean and Smith 1978). Gabrielino villages occupied the watersheds of various rivers (locally including the Santa Ana) and intermittent

streams. Chiefs were usually descended through the male line and often administered several villages. Gabrielino society was somewhat stratified and is thought to have contained three hierarchically ordered social classes which dictated ownership rights and social status and obligations (Bean and Smith 1978:540-546). Plants utilized for food were heavily relied upon and included acorn-producing oaks, as well as seed-producing grasses and sage. Animal protein was commonly derived from rabbits and deer in inland regions, while coastal populations supplemented their diets with fish, shellfish, and marine mammals (Boscana 1933, Heizer 1968, Johnston 1962, McCawley 1996). Dog, coyote, bear, tree squirrel, pigeon, dove, mud hen, eagle, buzzard, raven, lizards, frogs, and turtles were specifically not utilized as a food source (Kroeber 1925:652).

History

In Southern California, the historic era is generally divided into three periods: the Spanish or Mission Period (1769 to 1821), the Mexican or Rancho Period (1821 to 1848), and the American Period (1848 to present).

Spanish Period. The first European to pass through the area is thought to be a Spaniard called Father Francisco Garces. Having become familiar with the area, Garces acted as a guide to Juan Bautista de Anza, who had been commissioned to lead a group across the desert from a Spanish outpost in Arizona to set up quarters at the Mission San Gabriel in 1771 near what today is Pasadena (Beck and Haase 1974). Garces was followed by Alta California Governor Pedro Fages, who briefly explored the region in 1772 (Beck and Haase 1974).

Mexican Period. In 1821, Mexico overthrew Spanish rule and the missions began to decline. By 1833, the Mexican government passed the Secularization Act, and the missions, reorganized as parish churches, lost their vast land holdings, and released their neophytes (Beattie and Beattie 1974).

American Period. The American Period, 1848–Present, began with the Treaty of Guadalupe Hidalgo. In 1850, California was accepted into the Union of the United States primarily due to the population increase created by the Gold Rush of 1849. The cattle industry reached its greatest prosperity during the first years of the American Period. Mexican Period land grants had created large pastoral estates in California, and demand for beef during the Gold Rush led to a cattle boom that lasted from 1849–1855. However, beginning about 1855, the demand for beef began to decline due to imports of sheep from New Mexico and cattle from the Mississippi and Missouri Valleys. When the beef market collapsed, many California ranchers lost their ranchos through foreclosure.

A series of disastrous floods in 1861–1862, followed by a significant drought further diminished the economic impact of local ranching. This decline combined with ubiquitous agricultural and real estate developments of the late 19th century, set the stage for diversified economic pursuits that have continued to proliferate to this day (Beattie and Beattie 1974; Cleland 1941).

PERSONNEL

David Brunzell, M.A., RPA acted as the Project Manager and Principal Investigator for the current study. Mr. Brunzell also compiled the technical report and conducted the cultural resources records search at the South Central Coastal Information Center (SCCIC) located at California State University, Fullerton. BCR Consulting Archaeological Field Director Joseph Orozco, M.A., RPA and BCR Staff Historian and Archaeological Field Technician George Brentner, B.A., and Archaeological Field Technician Fabian Reyes-Martinez, B.A. conducted the pedestrian field survey.

METHODS

Records Search

Prior to fieldwork, an archaeological records search was conducted at the SCCIC by BCR Consulting Principal Investigator David Brunzell, M.A., RPA on February 2, 2022. This included a review of all recorded historic and prehistoric cultural resources, as well as a review of known cultural resources, and survey and excavation reports generated from projects completed within one half-mile of the project site.

Field Survey

An archaeological pedestrian field survey of the project site was conducted on March 7, 2022. The survey was conducted by walking parallel transects spaced approximately 10 meters apart across 100 percent of the unpaved portions of the project site. Soil exposures, including natural and artificial clearings were carefully inspected for evidence of cultural resources.

RESULTS

Records Search

Data from the SCCIC revealed that 44 cultural resource studies have taken place resulting in the recording of three cultural resources within a one half-mile radius of the project location. None of the previous studies have assessed the project location and no cultural resources have been previously recorded within its boundaries. The records search is summarized in Table B, and the complete records search bibliography is provided in Appendix A.

Table B. Cultural Resources and Reports Located Within One Mile of the APE

USGS 7.5 Minute Topographic Quad	Cultural Resources Within One Half-Mile of APE	Studies Within One Half- Mile
Irvine, California (1965)	P-30-1304: prehistoric lithic scatter (1/4 mile S) P-30-1657: Engineering Structure (1/4 mile SE) P-30-100150: prehistoric lithic scatter (1/2 mile NE)	OR-008, 168, 233, 281, 581, 586, 596, 621, 655, 669, 671, 672, 743, 761, 784, 802, 808, 897, 906, 1098, 1099, 1164, 1402, 1413, 1419, 1439, 1466, 1577, 1624, 1692, 1786, 2064, 2267, 2336, 2337, 2484, 3285, 3373, 3675, 3700, 3874, 3961, 4362, 4373

Field Survey

During the field survey, Mr. Orozco, Mr. Brentner, and Mr. Reyes-Martinez carefully inspected the project site and identified no cultural resources within its boundaries. Surface visibility was low within most of the project site due to asphalt and concrete paving and landscaping for the exiting park located within the project location. Sediments included sandy silts, with small to medium sized rocks. Ground disturbances resulted from mainly artificial factors related to the development of the adjacent walkways and park. The high level disturbance indicates relatively low sensitivity for buried archaeological resources.

RECOMMENDATIONS

BCR Consulting conducted a Cultural Resources Assessment of the Oak Creek Park Expansion and Improvement Project located in the City of Irvine, Orange County, California. The records search data combined with the field survey results have indicated that there are no cultural resources (including prehistoric or historic-period archaeological sites or historic buildings) within or adjacent to the project site, and conditions have failed to indicate sensitivity for buried cultural resources. Therefore BCR Consulting recommends that no additional cultural resource work or monitoring is necessary for any earthmoving proposed within the project site. However, if previously undocumented cultural resources are identified during earthmoving, a qualified archaeologist should be contacted to assess the nature and significance of the find, diverting construction excavation if necessary.

Findings were positive during the Sacred Lands File search with the NAHC. Since the City will initiate and carry out the required AB52 Native American Consultation, the results are not provided in this report. However, this report may be used during the consultation process, and BCR Consulting staff is available to answer questions and address concerns.

According to CEQA Guidelines, projects subject to CEQA must determine whether the project would “directly or indirectly destroy a unique paleontological resource”. The appended Paleontological Overview provided in Appendix D has recommended that:

> The geologic units underlying the project area are mapped entirely as young alluvial fan deposits dating from the late Pleistocene to Holocene epoch (Morton & Miller, 2006). Pleistocene alluvial units are considered to be of high paleontological sensitivity, and while the Western Science Center does not have localities within the project area or a one-mile radius, we do have multiple localities in similarly mapped units throughout the region. Pleistocene alluvial units are known to produce fossil specimens including those associated with mastodon (Mammut pacificus), mammoth (Mammuthus columbi), ancient horse (Equus sp.), camel (Camelops hesternus), sabertooth cats (Smilodon fatalis) and many more.
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> Any fossil specimens recovered from the Oak Creek Community Park Project would be scientifically significant. Excavation activity associated with the development of the project area would impact the paleontologically sensitive Pleistocene units, and it is the recommendation of the Western Science Center that a paleontological resource mitigation program be put in place to monitor, salvage, and curate any recovered fossils from the study area.

If human remains are encountered during the undertaking, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. The County Coroner must be notified of the find immediately. If the remains are determined to be prehistoric, the Coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a Most Likely Descendant (MLD). With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD shall complete the inspection within 48 hours of notification by the NAHC.

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2000 *Archaeological and Paleontological Assessments of the 75 Acre Festival Ridge Project Situated in the Dana Point Hills, City of Dana Point, County of Orange.* On File at BCR Consulting.

Williams, Patricia, Leah Messinger, Sarah Johnson
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Woodford, A.O., J.E. Schuellhamer, J.E. Wooder, and R.F. Yerkes
1954 Geology of the Los Angeles Basin. In *Geology of Southern California, Bulletin 170*. Division of Mines and Geology. San Francisco.

United States Geological Survey
1965 *Tustin, California* 7.5-minute topographic quadrangle map.

APPENDIX A

RECORDS SEARCH BIBLIOGRAPHY

Report List

PWK2103

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
OR-00008		1973	Gothold, Jane and Maguire, John	Pacific Coast Archaeological Society Survey Along the North Side of the San Diego Freeway	Pacific Coast Archaeological Society Quarterly	
OR-00168		1977	Desautels, Roger J.	Archaeological Survey Report on Parcels 1, 2, and 3 (4.8 Acres) of Lot 14 in Block 36 of the Yorba Linda Tract in the County of Orange	Scientific Resource Surveys, Inc.	
OR-00233		1977	Cottrell, Marie G.	Archaeological Survey Report for Village 12 and Village 14 (ORA-508 and ORA-543)		30-000543
OR-00281		1978		Appendix B Archaeological Survey	Westec Services, Inc.	
OR-00581		1982	McCoy, Lesley C. and Kirkish, Alex N.	Cultural Resources Data Recovery Program for the 230kv Transmission Line Rights-of-way From San Onofre Nuclear Generating Station to Black Star Canyon and Santiago Substation and to Encina and Mission Valley Substations	Cultural Systems Research, Inc.	30-000438, 30-000447, 30-000495, 30-000496, 30-000498, 30-000499, 30-000725, 30-000824, 30-000825, 30-000830, 30-000831
OR-00586		1980	Douglas, Ronald D.	Assessment of Cultural/scientific Resources, Village 12, Sce Hvtl Relocation, Irvine, California		30-000341
OR-00596		1979	Mabry, Theo N.	Archaeological Records Search and Reconaissance Survey: Orangetree Park 20-arce Initial Study, Irvine, Ca	Archaeological Planning Collaborative	
OR-00621		1981	Weisbord, Jill	Cultural Resource Survey of the Irvine Center Da, Village 13	LSA Associates, Inc.	
OR-00655		1980	Cottrell, Marie G.	Appendix C	Archaeological Resource Management Corp.	
OR-00669	Paleo -	1983	Padon, Beth	Assessment of Archaeological and Paleontological Resources Irvine Medical Complex Irvine, Ca	LSA Associates, Inc.	30-000341
OR-00671	Paleo -	1983	Padon, Beth	Assessment of Archaeological and Paleontological Resources Irvine Medical Center Irvine, California	LSA Associates, Inc.	
OR-00672		1983	Padon, Beth	Assessment of Archaeological Resources, Rv Storage Project Irvine, California	Larry Seeman Associates, Inc.	
OR-00743		1984	Padon, Beth	Historic Property Survey Report for the Proposed Sand Canyon/I-405 Interchange City of Irvine, California (ORA-405-2.9)	LSA Associates, Inc.	
OR-00761		1981	Anonymous	Cultural Resource Assessment Village 12 Development Site Irvine, California	LSA Associates, Inc.	30-000543

Report List

PWK2103

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
OR-00784		1985	Cady, R.L.	Historic Property Survey-negative Findings	Caltrans	
OR-00802		1985	Padon, Beth	An Archaeological Assessment Village 12 City of Irvine	LSA Associates, Inc.	
OR-00808		1979	Unknown	Final Environmental Impact Report Regional Domestic Water Storage and Transmission Facilities From Diemer/sac and Wellfield Systems to Existing Distribution Network	Culp/Wesner,Culp	30-000344, 30-000349, 30-000382, 30-000383
OR-00897		1988	Padon, Beth	Letter Report on Archaeological Monitoring for Tract #13094	LSA Associates, Inc.	
OR-00906		1988	Padon, Beth and Pat Jertberg	Cultural Resources Report for the San Diego Creek Drainage Basin Project Level Facilities Orange County,	LSA Associates, Inc.	
OR-01098		1991	Padon, Beth	Cultural/scientific Resources Assessment for Planning Area 13	LSA Associates, Inc.	
OR-01099		1979	Cooley, Theodore G.	Archaeological Resources Assessment Conducted for Proposed Irvine Ranch Water District Pipeline Right of Ways	Archaeological Resource Management Corp.	30-000344, 30-000349, 30-000382, 30-000383, 30-000556, 30-000647, 30-000806, 30-000807, 30-000808, 30-000809, 30-000810, 30-000811
OR-01164		1991	Evans, Stuart A.	A Cultural Resources Reconnaissance of the San Diego Creek Improvement/barranca Parkway Connection, Approximately 70 Acres in Irvine, Orange County, California.	RMW Paleo Associates, Inc.	30-000543, 30-001304, 30-100021
OR-01402		1994	Brock, James P.	Cultural Resources Assessment for the Irvine Desalter Project, Irvine, California	Archaeological Advisory Group	
OR-01413		1993	Whitney-Desautels, Nancy A. and David A. Kice	Cultural Resources Assessment of the Irvine Ranch Water District Alternate Aqueous Waste Disposal Facility Sites, Orange County, California	Scientific Resource Surveys, Inc.	
OR-01419		1994	Strudwick, Ivan H. and Bradley Sturm	Cultural Resource Assessment - Planning Area 12, City of Irvine, Orange County, California	LSA Associates, Inc.	30-000543, 30-001304
OR-01439		1980	McCoy, Lesley C. and Phillips Roxana	National Register Assessment Program of Cultural Resources of the 230 Kv Transmission Line Rights-of-way From San Onofre Nuclear Generating Station to Black Star Canyon and Santiago Substation and to Encina and Mission Valley Substation	Westec Services, Inc.	30-000419, 30-000438, 30-000447, 30-000495, 30-000496, 30-000498, 30-000499, 30-000640, 30-000700, 30-000725, 30-000782, 30-000784, 30-000785, 30-000786, 30-000787, 30-000823, 30-000824, 30-000825, 30-000826, 30-000827, 30-000828, 30-000829, 30-000830, 30-000831, 30-000832, 30-000905

Report List

PWK2103

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
OR-01466	Paleo -	1996	Rosenthal, Jane	Archaeological and Paleontological Monitoring of Preliminary Grading and Trenching for the Oak Creek Golf Course	Petra Resources, Inc.	
OR-01577	Paleo -	1997	Padon, Beth	Archaeological and Paleontological Monitoring of Preliminary Grading for Irvine Spectrum 6, Area B 1, 2, 3, Irvine, California	Petra Resources Inc.	30-100150
OR-01624	Paleo -	1997	Govena, Fran	Archaeological and Paleontological Monitoring Results for Pm97-114 Western Digital Site, Irvine, Orange County, California	Petra Resources Inc.	
OR-01692		1998	Jertberg, Patricia R.	Archaeological Monitoring of Preliminary Grading for Irvine Spectrum 6, Area a Phase I, Irvine, California	Petra Resources, Inc.	
OR-01786		1998	Brechbiel, Brant A.	Cultural Resources Records Search and Literature Review Report for a Pacific Bell Mobile Services Telecommunications Facility: Cm 052-12 in the City of Irvine, California	Chambers Group, Inc.	
OR-02064		2000	Lapin, Philippe	Cultural Resource Assessment for Modifications to Pacific Bell Mobile Services Facility Cm 052-12, County of Orange, California	LSA Associates, Inc.	
OR-02267	Paleo -	2000	Hunt, Kevin P.	An Archaeological and Paleontological Survey of the Irvine Spectrum Gpa Project	Brian F. Smith and Associates	30-000161, 30-000341, 30-000391, 30-000432, 30-000495, 30-000499, 30-000551, 30-000602, 30-000768, 30-000769, 30-000904, 30-001011, 30-001034, 30-001069, 30-001110, 30-100297, 30-100298
OR-02336	Paleo -	2000	Demcak, Carol R.	Final Report on Archaeological and Paleontological Monitoring Program Conducted at Spectrum 5, Irvine, Orange County, California	Archaeological Resource Management Corp.	
OR-02337	Paleo -	2000	Demcak, Carol and Milos Velechovsky	Final Report on Archaeological and Paleontological Monitoring Program Conducted at Spectrum 6, City of Irvine, Orange County, California	Archaeological Resource Management Corp.	
OR-02484	Paleo -	2001	Velechovsky, Milos and Carol R. Demcak	Final Report on Archaeological and Paleontological Monitoring Program Conducted at Spectrum 6, Marshburn Wash, City of Irvine, Orange County, California	ARMC	
OR-03285		2006	Fulton, Terri and Deborah McLean	Archaeological Mitigation Monitoring Report for the Irvine Desalter Pipelines Project	LSA Associates, Inc.	

Report List

PWK2103

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
OR-03373		2006	Arrington, Cindy and Nancy Sikes	Cultural Resources Final Report of Monitoring and Findings for the Qwest Network Construction Project State of California: Volumes I and Ii	SWCA Environmental Consultants, Inc.	
OR-03675		2007	Bonner, Wayne H.	Cultural Resources Records Search and Site Visit Results for Royal Street Communications, LLC Candidate LA2520A (SCE Tower-Aki Nursury), 6900 Alton Parkway, Irvine, Orange County, California	Michael Brandman Associates	
OR-03700		2007	Fulton, Phil	Archaeological Study Report Verizon Wireless Services Breakwater Facility City of Irvine Orange County, California	LSA Associates	30-000341, 30-000391
OR-03874		2010	Wlodarski, Robert J.	AT&T Wireless Telecommunications Site LA3219 (Smoke Tree & Irvine Center) NE Quad of Barranca Parkway and Jeffrey Road, Irvine, Ca. 92612	Cellular Archaeological Resource Evaluations	30-000543, 30-100442
OR-03961		2010	Wlodarski, Robert J.	Records Search and Field Reconnaissance for Proposed AT&T Wireless Telecommunications Site LA3174 (SCE Santiago Substation), Located Along Barranca Parkway, Irvine, California.	Cellular Archaeological Resource Evaluations	30-001657
OR-04362		1990	Shinn, Juanita R.	Cultural Resources Literature Review of the Irvine Desalter Study Area	RMW Paleo Associates, Inc.	30-000341, 30-000373, 30-000391
OR-04373	Paleo -	2011	Brunzell, David	Cultural Resources Assessment South Orange County Community College District Master Plan Irvine Valley College and Saddleback College Campuses Mission Viejo and Irvine, Orange County, California	BCR Consulting	

Resource List

PWK2103

Primary No.	Trinomial	Other IDs	Type	Age	Attribute codes	Recorded by	Reports
P-30-001304	CA-ORA-001304	Resource Name - S-1	Site		AP02	1991 (EVANS, RMW Paleo Associates, Inc.); 1994 (Strudwick, LSA Associates)	LA-10429, OR-01164, OR-01419, OR-02261, OR-03860
P-30-001657		Resource Name - LSA-CEJ0602-S-1	Site	Historic	HP11	2006 (M. Aron, D. Ewers, LSA)	OR-03961
P-30-100150		Resource Name - OR1577 isolate	Other	Prehistoric	AP02	1997 (P. Eisentraut, SCCIC)	OR-01577

APPENDIX B

NATIVE AMERICAN HERITAGE COMMISSION SACRED LANDS FILE SEARCH

NATIVE AMERICAN HERITAGE COMMISSION

CHAIRPERSON
Laura Miranda
Luiseño

VICE CHAIRPERSON
Reginald Pagaling
Chumash

SECRETARY
Merri Lopez-Keifer
Luiseño

PARLIAMENTARIAN
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COMMISSIONER
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COMMISSIONER
Julie Tumamait-Stenslie
Chumash

COMMISSIONER
[**Vacant**]

COMMISSIONER
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EXECUTIVE SECRETARY
Christina Snider
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NAHC HEADQUARTERS
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Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

October 27, 2021

Nicholas Shepetuk
BCR Consulting LLC

Via Email to: nickshepetuk@gmail.com

Re: Native American Tribal Consultation, Pursuant to the Assembly Bill 52 (AB 52), Amendments to the California Environmental Quality Act (CEQA) (Chapter 532, Statutes of 2014), Public Resources Code Sections 5097.94 (m), 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21083.09, 21084.2 and 21084.3, Oak Creek Community Park Project, Orange County

Dear Mr. Shepetuk:

Pursuant to Public Resources Code section 21080.3.1 (c), attached is a consultation list of tribes that are traditionally and culturally affiliated with the geographic area of the above-listed project. Please note that the intent of the AB 52 amendments to CEQA is to avoid and/or mitigate impacts to tribal cultural resources, (Pub. Resources Code §21084.3 (a)) ("Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource.")

Public Resources Code sections 21080.3.1 and 21084.3(c) require CEQA lead agencies to consult with California Native American tribes that have requested notice from such agencies of proposed projects in the geographic area that are traditionally and culturally affiliated with the tribes on projects for which a Notice of Preparation or Notice of Negative Declaration or Mitigated Negative Declaration has been filed on or after July 1, 2015. Specifically, Public Resources Code section 21080.3.1 (d) provides:

Within 14 days of determining that an application for a project is complete or a decision by a public agency to undertake a project, the lead agency shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, which shall be accomplished by means of at least one written notification that includes a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation pursuant to this section.

The AB 52 amendments to CEQA law does not preclude initiating consultation with the tribes that are culturally and traditionally affiliated within your jurisdiction prior to receiving requests for notification of projects in the tribe's areas of traditional and cultural affiliation. The Native American Heritage Commission (NAHC) recommends, but does not require, early consultation as a best practice to ensure that lead agencies receive sufficient information about cultural resources in a project area to avoid damaging effects to tribal cultural resources.

The NAHC also recommends, but does not require that agencies should also include with their notification letters, information regarding any cultural resources assessment that has been completed on the area of potential effect (APE), such as:

1. The results of any record search that may have been conducted at an Information Center of the California Historical Resources Information System (CHRIS), including, but not limited to:

- A listing of any and all known cultural resources that have already been recorded on or adjacent to the APE, such as known archaeological sites;
- Copies of any and all cultural resource records and study reports that may have been provided by the Information Center as part of the records search response;
- Whether the records search indicates a low, moderate, or high probability that unrecorded cultural resources are located in the APE; and
- If a survey is recommended by the Information Center to determine whether previously unrecorded cultural resources are present.

2. The results of any archaeological inventory survey that was conducted, including:

    - Any report that may contain site forms, site significance, and suggested mitigation measures.

      All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure in accordance with Government Code section 6254.10.

3. The result of any Sacred Lands File (SLF) check conducted through the Native American Heritage Commission was positive. Please contact the Juaneno Band of Mission Indians and the Juaneno Band of Mission Indians Acjachemen Nation - Belardes on the attached list for more information.

4. Any ethnographic studies conducted for any area including all or part of the APE; and

5. Any geotechnical reports regarding all or part of the APE.

Lead agencies should be aware that records maintained by the NAHC and CHRIS are not exhaustive and a negative response to these searches does not preclude the existence of a tribal cultural resource. A tribe may be the only source of information regarding the existence of a tribal cultural resource.

This information will aid tribes in determining whether to request formal consultation. In the event that they do, having the information beforehand will help to facilitate the consultation process.

If you receive notification of change of addresses and phone numbers from tribes, please notify the NAHC. With your assistance, we can assure that our consultation list remains current.

If you have any questions, please contact me at my email address: Andrew.Green@nahc.ca.gov.

Sincerely,

Andrew Green

Andrew Green
Cultural Resources Analyst

Attachment

Native American Heritage Commission
Tribal Consultation List
Orange County
10/27/2021

Campo Band of Diegueno Mission Indians
Ralph Goff, Chairperson
36190 Church Road, Suite 1 — Diegueno
Campo, CA, 91906
Phone: (619) 478 - 9046
Fax: (619) 478-5818
rgoff@campo-nsn.gov

Ewiiaapaayp Band of Kumeyaay Indians
Robert Pinto, Chairperson
4054 Willows Road — Diegueno
Alpine, CA, 91901
Phone: (619) 368 - 4382
Fax: (619) 445-9126
ceo@ebki-nsn.gov

Ewiiaapaayp Band of Kumeyaay Indians
Michael Garcia, Vice Chairperson
4054 Willows Road — Diegueno
Alpine, CA, 91901
Phone: (619) 933 - 2200
Fax: (619) 445-9126
michaelg@leaningrock.net

Gabrieleno Band of Mission Indians - Kizh Nation
Andrew Salas, Chairperson
P.O. Box 393 — Gabrieleno
Covina, CA, 91723
Phone: (626) 926 - 4131
admin@gabrielenoindians.org

Gabrieleno/Tongva San Gabriel Band of Mission Indians
Anthony Morales, Chairperson
P.O. Box 693 — Gabrieleno
San Gabriel, CA, 91778
Phone: (626) 483 - 3564
Fax: (626) 286-1262
GTTribalcouncil@aol.com

Gabrielino /Tongva Nation
Sandonne Goad, Chairperson
106 1/2 Judge John Aiso St., #231 — Gabrielino
Los Angeles, CA, 90012
Phone: (951) 807 - 0479
sgoad@gabrielino-tongva.com

Gabrielino Tongva Indians of California Tribal Council
Robert Dorame, Chairperson
P.O. Box 490 — Gabrielino
Bellflower, CA, 90707
Phone: (562) 761 - 6417
Fax: (562) 761-6417
gtongva@gmail.com

Gabrielino Tongva Indians of California Tribal Council
Christina Conley, Tribal Consultant and Administrator
P.O. Box 941078 — Gabrielino
Simi Valley, CA, 93094
Phone: (626) 407 - 8761
christina.marsden@alumni.usc.edu

Gabrielino-Tongva Tribe
Charles Alvarez,
23454 Vanowen Street — Gabrielino
West Hills, CA, 91307
Phone: (310) 403 - 6048
roadkingcharles@aol.com

Juaneno Band of Mission Indians
Sonia Johnston, Chairperson
P.O. Box 25628 — Juaneno
Santa Ana, CA, 92799
sonia.johnston@sbcglobal.net

Juaneno Band of Mission Indians Acjachemen Nation - Belardes
Matias Belardes, Chairperson
32161 Avenida Los Amigos — Juaneno
San Juan Capisttrano, CA, 92675
Phone: (949) 293 - 8522
kaamalam@gmail.com

La Posta Band of Diegueno Mission Indians
Gwendolyn Parada, Chairperson
8 Crestwood Road — Diegueno
Boulevard, CA, 91905
Phone: (619) 478 - 2113
Fax: (619) 478-2125
LP13boots@aol.com

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and section 5097.98 of the Public Resources Code.

This list is only applicable for consultation with Native American tribes under Public Resources Code Sections 21080.3.1 for the proposed Oak Creek Community Park Project, Orange County.

Native American Heritage Commission
Tribal Consultation List
Orange County
10/27/2021

La Posta Band of Diegueno Mission Indians
Javaughn Miller, Tribal Administrator
8 Crestwood Road — Diegueno
Boulevard, CA, 91905
Phone: (619) 478 - 2113
Fax: (619) 478-2125
jmiller@LPtribe.net

Manzanita Band of Kumeyaay Nation
Angela Elliott Santos, Chairperson
P.O. Box 1302 — Diegueno
Boulevard, CA, 91905
Phone: (619) 766 - 4930
Fax: (619) 766-4957

Mesa Grande Band of Diegueno Mission Indians
Michael Linton, Chairperson
P.O Box 270 — Diegueno
Santa Ysabel, CA, 92070
Phone: (760) 782 - 3818
Fax: (760) 782-9092
mesagrandeband@msn.com

Pala Band of Mission Indians
Shasta Gaughen, Tribal Historic Preservation Officer
PMB 50, 35008 Pala Temecula Rd. — Cupeno, Luiseno
Pala, CA, 92059
Phone: (760) 891 - 3515
Fax: (760) 742-3189
sgaughen@palatribe.com

Santa Rosa Band of Cahuilla Indians
Lovina Redner, Tribal Chair
P.O. Box 391820 — Cahuilla
Anza, CA, 92539
Phone: (951) 659 - 2700
Fax: (951) 659-2228
lsaul@santarosa-nsn.gov

Soboba Band of Luiseno Indians
Joseph Ontiveros, Cultural Resource Department
P.O. BOX 487 — Cahuilla
San Jacinto, CA, 92581 — Luiseno
Phone: (951) 663 - 5279
Fax: (951) 654-4198
jontiveros@soboba-nsn.gov

Soboba Band of Luiseno Indians
Isaiah Vivanco, Chairperson
P. O. Box 487 — Cahuilla
San Jacinto, CA, 92581 — Luiseno
Phone: (951) 654 - 5544
Fax: (951) 654-4198
ivivanco@soboba-nsn.gov

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and section 5097.98 of the Public Resources Code.

This list is only applicable for consultation with Native American tribes under Public Resources Code Sections 21080.3.1 for the proposed Oak Creek Community Park Project, Orange County.

APPENDIX C

PROJECT PHOTOGRAPHS

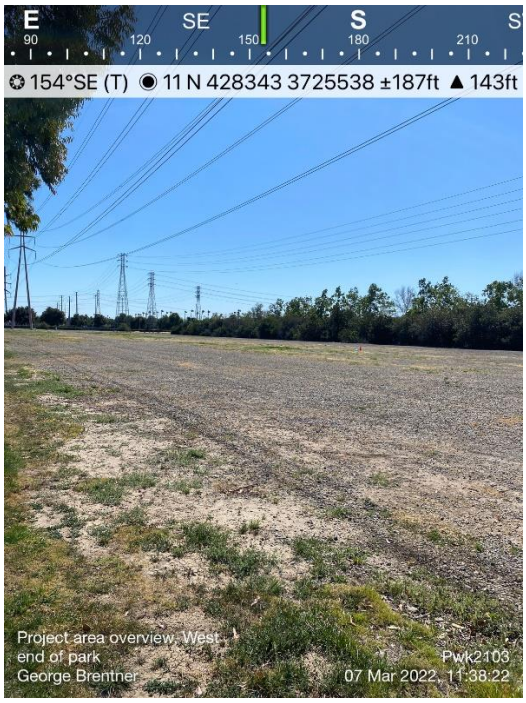


Photo 1. Project overview (View SE)

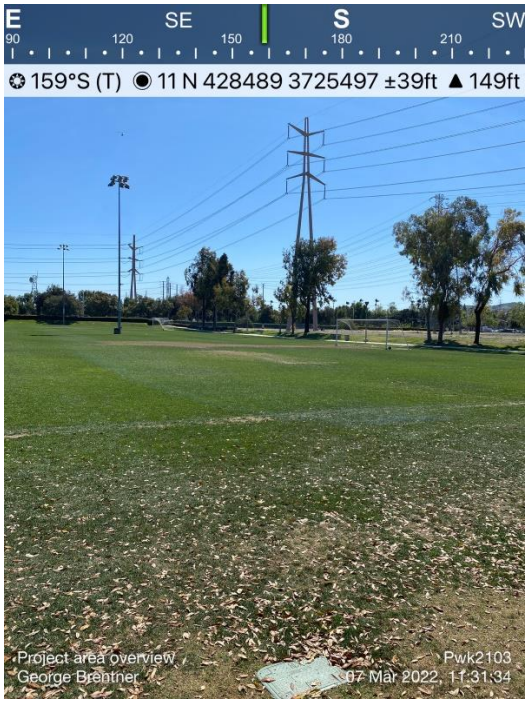


Photo 2. Project overview (View S)

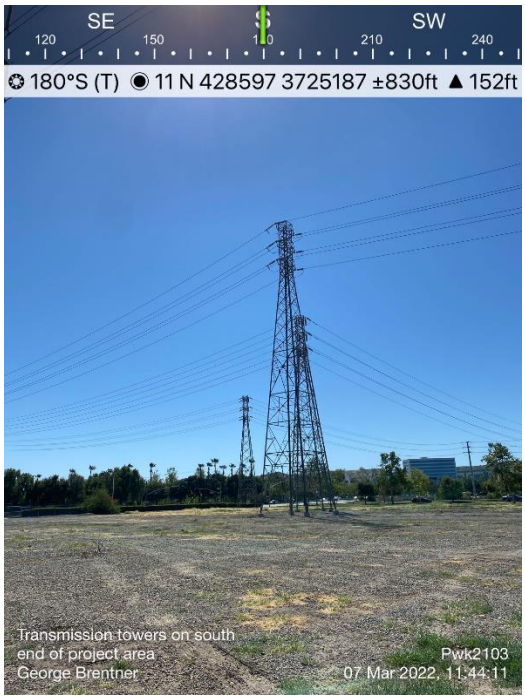


Photo 3. Project overview (View S)

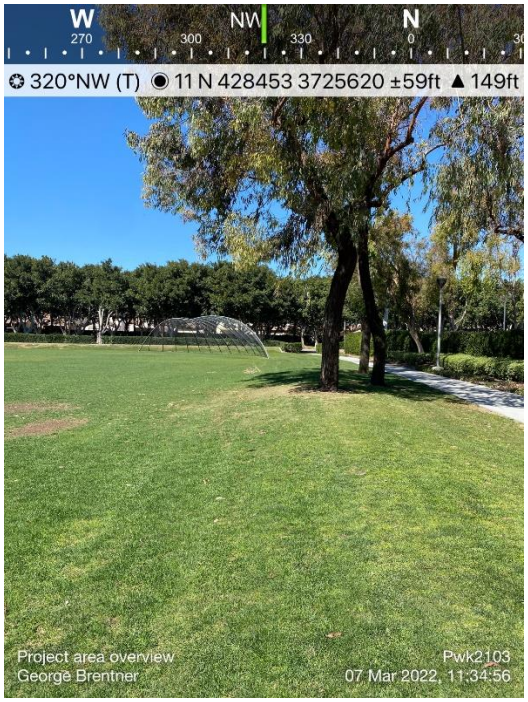


Photo 4. Project overview (View NW)

APPENDIX D

PALEONTOLOGICAL RESOURCES OVERVIEW

WESTERN SCIENCE CENTER

BCR Consulting LLC
Nicholas Shepetuk
505 West 8th Street
Claremont, CA 91711

October 14, 2021

Dear Mr. Shepetuk,

This letter presents the results of a record search conducted for the Oak Creek Community Park Project in the city of Irvine, Orange County, California. The project site is located south of Valley Oak Drive, north of Sand Canyon Avenue, east of Barranca Parkway, and west of Irvine Center Drive in a non-sectioned portion of Township 6 South, and Range 9 West, on the *Tustin, CA* USGS 7.5-minute quadrangle.

The geologic units underlying the project area are mapped entirely as young alluvial fan deposits dating from the late Pleistocene to Holocene epoch (Morton & Miller, 2006). Pleistocene alluvial units are considered to be of high paleontological sensitivity, and while the Western Science Center does not have localities within the project area or a one-mile radius, we do have multiple localities in similarly mapped units throughout the region. Pleistocene alluvial units are known to produce fossil specimens including those associated with mastodon (*Mammut pacificus*), mammoth (*Mammuthus columbi*), ancient horse (*Equus sp.*), camel (*Camelops hesternus*), sabertooth cats (*Smilodon fatalis*) and many more.

Any fossil specimens recovered from the Oak Creek Community Park Project would be scientifically significant. Excavation activity associated with the development of the project area would impact the paleontologically sensitive Pleistocene units, and it is the recommendation of the Western Science Center that a paleontological resource mitigation program be put in place to monitor, salvage, and curate any recovered fossils from the study area.

If you have any questions, or would like further information, please feel free to contact me at dradford@westerncentermuseum.org

Sincerely,

Darla Radford
Collections Manager

Oak Creek Community Park Project

Project area, one mile radius, geologic mapping and any WSC fossil localities.

Legend

- Project area and one mile radius
- Qyf: Young alluvial fan deposits (late Pleistocene to Holocene)

WESTPARK
WOODBRIDGE
OAK CREEK
ORANGE COUNTY GREAT PARK
EAST IRVINE
UNIVERSITY PARK
QUAIL HILL
IRVINE SPECTRUM CENTER
Jeffrey Rd
Barranca Pkwy
Alton Pkwy
Laguna Canyon Rd
University Dr
5
133
405

Google Earth

N

1 mi

Appendix C Limited Geotechnical Investigation

Appendix

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LIMITED GEOTECHNICAL INVESTIGATION

PROPOSED IMPROVEMENTS TO EXISTING PARK
OAK CREEK COMMUNITY PARK
15616 VALLEY OAK DRIVE
IRVINE, CALIFORNIA



GEOCON
WEST, INC.

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

SCHMIDT DESIGN GROUP, INC.
SAN DIEGO, CALIFORNIA

PROJECT NO. W1035-88-01

APRIL 14, 2022

Project No. W1035-88-01
April 14, 2022

Mr. Jeff Justus
Schmidt Design Group, Inc.
1310 Rosecrans Street, Suite G
San Diego, California 92106

Subject: LIMITED GEOTECHNICAL INVESTIGATION
PROPOSED IMPROVEMENTS TO EXISTING PARK
OAK CREEK COMMUNITY PARK
15616 VALLEY OAK DRIVE
IRVINE, CALIFORNIA 92618

Dear Mr. Justus:

In accordance with your authorization of our proposal, dated March 4, 2019, we have performed a limited geotechnical investigation for the proposed improvements to the Oak Creek Community Park located at 15616 Oak Valley Drive in the City of Irvine, California. The accompanying report presents the findings of our study, and our conclusions and recommendations pertaining to the geotechnical aspects of proposed design and construction. Based on the results of our investigation, it is our opinion that the project can be constructed as proposed provided the recommendations of this report are followed and implemented during design and construction.

If you have any questions regarding this report, or if we may be of further service, please contact the undersigned.

Very truly yours,

GEOCON WEST, INC.

REGISTERED PROFESSIONAL ENGINEER
JELISA THOMAS ADAMS
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(EMAIL) Addressee

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LIMITED GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of a limited geotechnical investigation for the proposed improvements to the Oak Creek Community Park located at 15616 Valley Oak Drive in the City of Irvine, California (see Vicinity Map, Figure 1). The purpose of the investigation was to evaluate subsurface soil and geologic conditions underlying the site and, based on conditions encountered, to provide conclusions and recommendations pertaining to the geotechnical aspects of design and construction.

The scope of this investigation included a site reconnaissance, field exploration, laboratory testing, engineering analysis, and the preparation of this report. The site was explored on March 7, 2022, by excavating five 3¼-inch diameter borings to depths ranging from approximately 5 to 6 feet below the existing ground surface using manual hand auger equipment and digging tools. An additional boring (B3A), was excavated near boring location B3 for percolation testing. The approximate locations of the exploratory borings are depicted on the Site Plan (see Figures 2A and 2B). A detailed discussion of the field investigation, including boring logs, is presented in Appendix A.

Laboratory tests were performed on selected soil samples obtained during the investigation to determine pertinent physical and chemical soil properties. Appendix B presents a summary of the laboratory test results.

The recommendations presented herein are based on analysis of the data obtained during the investigation and our experience with similar soil and geologic conditions. References reviewed to prepare this report are provided in the *List of References* section.

If project details vary significantly from those described herein, Geocon should be contacted to determine the necessity for review and possible revision of this report.

2. SITE AND PROJECT DESCRIPTION

The subject property is located at 15616 Valley Oak Drive in the City of Irvine, California. The property is bounded by Valley Oak Drive to the northwest, an asphalt parking lot to the east and northeast, Sand Canyon Avenue to the southeast, and Barranca Parkway to the west and southwest. The subject property is occupied by an existing roughly level SCE Easement with overhead powerline structures and the existing Oak Creek Community Park. Existing improvements within the park include a single-story restroom building, a single-story canopy structure, two soccer fields, an open grass area with a chainlink backstop for softball and baseball activities, playground equipment, asphalt paved parking lots, and concrete walkways. The area of proposed improvements is generally roughly level with no pronounced highs or lows. Within the open grass area, there are isolated, built-up mounds creating localized high areas. Additionally, there is a northwest to southeast trending berm that separates the SCE Easement from the existing park. The berm is roughly level with the existing soccer fields at the southeast extent and increases in height to approximately 5 feet at the northwest extent. Surface water drainage at the site appears to be by sheet flow along the existing ground contours to existing area drains and the city streets. Vegetation on site consists of shrubs, grass and trees.

Based on the information provided by the Client, it is our understanding that the proposed improvements will consist of: a new soccer field in the area of the existing open grass area with new field lighting; repurposing the southeast soccer field into a dog park; and a multipurpose field and asphalt parking lot within the SCE Easement. Additional improvements will consist of site lighting, fences, and concrete walkways. It is anticipated that the proposed field lighting for the soccer field will be supported on deepened foundations consisting of piles. This report assumes that the proposed athletic fields will be natural turf.

Based on the preliminary nature of the design at this time, design loads were not available. It is anticipated that the foundations supporting proposed improvements may require a bearing pressure up to 1,500 pounds per square foot.

Once information on the existing and proposed grades are available and the design phase and foundation loading configuration proceeds to a more finalized plan, the recommendations within this report should be reviewed and revised, if necessary. Any changes in the design, location or elevation of any structure, as outlined in this report, should be reviewed by this office. Geocon should be contacted to determine the necessity for review and possible revision of this report.

3. SOIL AND GEOLOGIC CONDITIONS

Based on our field investigation and published geologic maps of the area, the site is underlain by artificial fill and unconsolidated Holocene age young alluvial fan deposits consisting of gravel, sand and silt (USGS, 1999). Detailed stratigraphic profiles of the materials encountered at the site are provided on the boring logs in Appendix A.

3.1 Artificial Fill

Artificial fill was encountered in our explorations to a maximum depth of ½ foot below the existing ground surface. Artificial fill was not encountered in boring B1. The artificial fill generally consists of brown to dark brown sandy clay and clay with sand. Within the existing soccer fields, the artificial fill consists of a silty sand substrate, likely to support the growth of grass. The artificial fill is characterized as slightly moist and firm. The fill is likely the result of past grading or construction activities at the site. Deeper fill may exist between excavations and in other portions of the site that were not directly explored.

3.2 Young Alluvial Fan Deposits

Holocene age young alluvial fan deposits were encountered beneath the fill. The alluvial deposits generally consist of brown to dark brown, sandy clay and clay with varying amounts of sand and calcium carbonate stringers. The alluvial deposits are slightly moist to moist and firm to stiff.

4. GROUNDWATER

Based on a review of the Seismic Hazard Zone Report of the Tustin Quadrangle, (California Division of Mines and Geology [CDMG], 2001), the historically highest groundwater level in the area is greater than 40 feet beneath the ground surface. Groundwater information presented in this document is generated from data collected in the early 1900's to the late 1990s. Based on current groundwater basin management practices, it is unlikely that groundwater levels will ever exceed the historic high levels.

Groundwater was not encountered in our field explorations, drilled to a maximum depth of 6 feet below the existing ground surface. However, it is not uncommon for groundwater levels to vary seasonally or for groundwater seepage conditions to develop where none previously existed, especially in impermeable fine-grained soils which are heavily irrigated or after seasonal rainfall. In addition, recent requirements for stormwater infiltration could result in shallower seepage conditions in the immediate site vicinity. Proper surface drainage of irrigation and precipitation will be critical for future performance of the project. Recommendations for drainage are provided in the S*urface Drainage* section of this report (see Section 6.14).

5. SEISMIC DESIGN CRITERIA

The following table summarizes the site-specific design criteria obtained from the 2019 California Building Code (CBC; Based on the 2018 International Building Code [IBC] and ASCE 7-16), Chapter 16 Structural Design, Section 1613 Earthquake Loads. The data was calculated using the online application *Seismic Design Maps*, provided by OSHPD. The short spectral response uses a period of 0.2 second. We evaluated the Site Class based on the discussion in Section 1613.2.2 of the 2019 CBC and Table 20.3-1 of ASCE 7-16. The values presented below are for the risk-targeted maximum considered earthquake (MCE_R).

2019 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2019 CBC Reference
Site Class	D	Section 1613.2.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	1.243g	Figure 1613.2.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.445g	Figure 1613.2.1(2)
Site Coefficient, F_A	1.003	Table 1613.2.3(1)
Site Coefficient, F_V	1.855*	Table 1613.2.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	1.247g	Section 1613.2.3 (Eqn 16-36)
Site Class Modified MCE_R Spectral Response Acceleration – (1 sec), S_{M1}	0.826g*	Section 1613.2.3 (Eqn 16-37)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	0.831g	Section 1613.2.4 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.551g*	Section 1613.2.4 (Eqn 16-39)

Note:

*Per Section 11.4.8 of ASCE/SEI 7-16, a ground motion hazard analysis shall be performed for projects for Site Class "E" sites with Ss greater than or equal to 1.0g and for Site Class "D" and "E" sites with S1 greater than 0.2g. Section 11.4.8 also provides exceptions which indicates that the ground motion hazard analysis may be waived provided the exceptions are followed. Using the code based values presented in the table above, in lieu of a performing a ground motion hazard analysis, requires the exceptions outlined in ASCE 7-16 Section 11.4.8 be followed.

The table below presents the mapped maximum considered geometric mean (MCE_G) seismic design parameters for projects located in Seismic Design Categories of D through F in accordance with ASCE 7-16.

ASCE 7-16 PEAK GROUND ACCELERATION

Parameter	Value	ASCE 7-16 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.521g	Figure 22-9
Site Coefficient, F_{PGA}	1.1	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.573g	Section 11.8.3 (Eqn 11.8-1)

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 General

6.1.1 It is our opinion that neither soil nor geologic conditions were encountered during the investigation that would preclude the construction of the proposed improvements provided the recommendations presented herein are followed and implemented during design and construction.

6.1.2 Up to ½ feet of existing artificial fill was encountered during the site investigation. The existing fill encountered is believed to be the result of past grading and construction activities at the site. Deeper fill may exist in other areas of the site that were not directly explored. The existing fill, in its present condition, is not suitable for direct support of proposed foundations and slabs. The existing fill and site soils are suitable for re-use as engineered fill provided the recommendations in the *Grading* section of this report are followed (see Section 6.4).

6.1.3 The on-site native soils are considered to have a "high" expansion potential and are classified as "expansive". These soils may be subject to swelling and shrinking cycles following the introduction of water due to precipitation, irrigation, or other means. Design and maintenance of proper drainage will be critical to the future performance of this project in order to reduce the potential for adverse impacts due to expansive soil, such as paving offsets or differential soil movement.

Foundations for miscellaneous small structures, such as block walls up to 6 feet in height, planter walls or trash enclosures, may be supported on conventional foundations bearing on a minimum of 12 inches of newly placed engineered fill which extends laterally at least 12 inches beyond the foundation area, or in the competent alluvial soils found at and below a depth of 1 foot below the ground surface. Where excavation and proper compaction cannot be performed, foundations may derive support directly in the undisturbed alluvial soils found at and below a depth of 1 foot, and should be deepened as necessary to maintain a minimum 12-inch embedment into the recommended bearing materials or a minimum 30 inch embedment below the lowest adjacent grade (whichever is deeper). If the soils exposed in the excavation bottom are soft or loose, compaction of the soils will be required prior to placing steel or concrete. Compaction of the foundation excavation bottom is typically accomplished with a compaction wheel or mechanical whacker and must be observed and approved in writing by a Geocon representative.

6.1.4 Cast-in-place friction piles may be utilized for support of the proposed light pole structures, provided foundations derive support in the competent alluvium found at or below a depth of 2 feet. Recommendations for friction pile design are provided in Section 6.8 of this report.

6.1.5 All excavations must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon). Recommendations for earthwork are provided in the *Grading* section of this report (see Section 6.4).

6.1.6 It is anticipated that stable excavations for the proposed improvements can be achieved with sloping measures. However, if excavations in close proximity to an adjacent property line and/or structure are required, special excavation measures may be necessary in order to maintain lateral support of offsite improvements. Excavation recommendations are provided in the *Temporary Excavations* section of this report (Section 6.12).

6.1.7 Where new paving or hardscape is to be placed, it is recommended that all existing fill be excavated and properly compacted for paving support. The client should be aware that excavation and compaction of all existing fill in the area of new paving is not required; however, paving constructed over existing uncertified fill may experience increased settlement and/or cracking and may therefore have a shorter design life and increased maintenance costs. As a minimum, the upper 12 inches of subgrade soil should be excavated, moisture conditioned to 2 to 3 percent above optimum moisture content, and properly compacted for paving support. Paving recommendations are provided in the *Exterior Concrete Slabs-on-Grade* section of this report (see Section 6.10).

6.1.8 Based on the results of the percolation testing performed at the site, a stormwater infiltration system is considered feasible for this project. Recommendations for infiltration are provided in *Stormwater Infiltration* section of this report (see Section 6.13).

6.1.9 Once the design and foundation loading configuration for the proposed improvements proceeds to a more finalized plan, the recommendations within this report should be reviewed and revised, if necessary. Based on the final foundation loading configurations, the potential for settlement should be re-evaluated by this office.

6.1.10 Any changes in the design, location or elevation, as outlined in this report, should be reviewed by this office. Geocon should be contacted to determine the necessity for review and possible revision of this report.

6.2 Soil and Excavation Characteristics

6.2.1 The in-situ soils can be excavated with moderate effort using conventional excavation equipment. Some caving should be anticipated in unshored excavations, especially where granular soils are present.

6.2.2 It is the responsibility of the contractor to ensure that all excavations and trenches are properly shored and maintained in accordance with applicable OSHA rules and regulations to maintain safety and maintain the stability of existing adjacent improvements.

6.2.3 All onsite excavations must be conducted in such a manner that potential surcharges from existing structures, construction equipment, and vehicle loads are resisted. The surcharge area may be defined by a 1:1 projection down and away from the bottom of an existing foundation or vehicle load. Penetrations below this 1:1 projection will require special excavation measures such as sloping or shoring. Excavation recommendations are provided in the *Temporary Excavations* section of this report (see Section 6.12).

6.2.4 The upper 3 feet of the soils encountered during the field investigation are considered to have a "high" expansion potential and are classified as "expansive" (expansion index [EI] of 109 and 119) as defined by 2019 California Building Code (CBC) Section 1803.5.3. Recommendations presented herein assume that miscellaneous foundations and hardscape will derive support in these materials.

6.3 Water-Soluble Sulfate

6.3.1 Laboratory tests were performed on representative samples of the site materials to measure the percentage of water-soluble sulfate content. Results from the laboratory water-soluble sulfate tests are presented in Appendix B (Figure B11) and indicate that the on-site materials possess a sulfate exposure class of "S2" to concrete structures as defined by 2019 CBC Section 1904 and ACI 318-19 Chapter 19. The table below presents a summary of concrete requirements set forth by 2019 CBC Section 1904 and ACI 318. The presence of water-soluble sulfates is not a visually discernible characteristic; therefore, other soil samples from the site could yield different concentrations. Additionally, over time landscaping activities (i.e., addition of fertilizers and other soil nutrients) may affect the concentration.

REQUIREMENTS FOR CONCRETE EXPOSED TO SULFATE-CONTAINING SOLUTIONS

Exposure Class	Water-Soluble Sulfate (SO_4) Percent by Weight	Cement Type (ASTM C150)		Maximum Water to Cement Ratio by Weight[1]	Minimum Compressive Strength (psi)
S0	SO_4<0.10	No Type Restriction		n/a	2,500
S1	0.10≤SO_4<0.20	II		0.50	4,000
S2	**0.20≤SO_4≤2.00**	**V**		**0.45**	**4,500**
S3	SO_4>2.00	Option 1	V+Pozzolan or Slag	0.45	4,500
		Option 2	V	0.40	5,000

[1] Maximum water to cement ratio limits do not apply to lightweight concrete

6.4 Grading

6.4.1 Grading is anticipated to include preparation of existing site soils for pavement and hardscape construction, and excavations for miscellaneous foundations.

6.4.2 A preconstruction conference should be held at the site prior to the beginning of grading operations with the owner, contractor, civil engineer, geotechnical engineer, and, if applicable, building official in attendance. Special soil handling requirements can be discussed at that time.

6.4.3 Earthwork should be observed, and compacted fill tested by representatives of Geocon West, Inc. The existing fill encountered during exploration is suitable for re-use as an engineered fill, provided any encountered oversize material (greater than 6 inches) and any encountered deleterious debris is removed. All existing underground improvements planned for removal should be completely excavated and the resulting depressions properly backfilled in accordance with the procedures described herein.

6.4.4 Grading should commence with the removal of all existing vegetation and existing improvements from the area to be graded. Deleterious debris such as wood and root structures should be exported from the site and should not be mixed with the fill soils. Asphalt and concrete should not be mixed with the fill soils unless approved by the Geotechnical Engineer. All existing underground improvements planned for removal should be completely excavated and the resulting depressions properly backfilled in accordance with the procedures described herein.

6.4.5 All excavations must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon).

6.4.6 All fill and backfill soils should be placed in horizontal loose layers approximately 6 to 8 inches thick, moisture conditioned to 2 to 3 percent above optimum moisture content, and compacted to at least 90 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition).

6.4.7 Based on the laboratory testing of the in-situ moisture content, the grading contractor should be aware that the existing soils are currently several points above optimum moisture content. Conditions could change seasonally. If the soils are in excess of 3 to 5 percent above optimum moisture content at the time of construction the soils will likely require some spreading and drying activities in order to achieve proper compaction.

6.4.8 It is anticipated that stable excavations for construction of proposed improvements can be achieved with sloping measures. However, if excavations in close proximity to an adjacent property line and/or structure are required, special excavation measures may be necessary in order to maintain lateral support of the existing offsite improvements. Excavation recommendations are provided in the *Temporary Excavations* section of this report (Section 6.12).

6.4.9 Foundations for miscellaneous small structures, such as block walls less than 6 feet high, planter walls or trash enclosures may be supported on conventional foundations deriving support on a minimum of 12 inches of newly placed engineered fill which extends laterally at least 12 inches beyond the foundation area. Where excavation and proper compaction cannot be performed, foundations may derive support directly in the undisturbed alluvial soils found at and below a depth of 1 foot, and should be deepened as necessary to maintain a minimum 12-inch embedment into the recommended bearing materials or a minimum 30 inch embedment below the lowest adjacent grade (whichever is deeper). If the soils exposed in the excavation bottom are soft or loose, compaction of the soils will be required prior to placing steel or concrete. Compaction of the foundation excavation bottom is typically accomplished with a compaction wheel or mechanical whacker and must be observed and approved by a Geocon representative.

6.4.10 Where new paving or hardscape is to be placed, it is recommended that all existing fill and soft alluvial soils be excavated and properly compacted for paving support. The client should be aware that excavation and compaction of all existing fill and soft alluvial soils in the area of new paving is not required; however, paving constructed over existing uncertified fill or unsuitable alluvial soil may experience increased settlement and/or cracking, and may therefore have a shorter design life and increased maintenance costs. As a minimum, the upper 12 inches of subgrade soil should be scarified and properly compacted for paving support. *Preliminary Pavement Recommendations* section of this report (see Section 6.11).

6.4.11 Imported fill shall be observed, tested, and approved by Geocon West, Inc. prior to bringing soil to the site. Rocks larger than 6 inches in diameter shall not be used in the fill. Import soils should have an expansion index less than 50, and corrosivity properties that are equally or less detrimental to that of the existing onsite soils (see Figure B11).

6.4.12 Utility trenches should be properly backfilled in accordance with the following requirements. The pipe should be bedded with clean sands (Sand Equivalent greater than 30) to a depth of at least 1 foot over the pipe, and the bedding material must be inspected and approved in writing by the Geotechnical Engineer (a representative of Geocon). The use of gravel is not acceptable unless used in conjunction with filter fabric to prevent the gravel from having direct contact with soil. The remainder of the trench backfill may be derived from onsite soil or approved import soil, compacted as necessary, until the required compaction is obtained. The use of minimum 2-sack slurry is also acceptable as backfill. Prior to placing any bedding material or pipes, the trench excavation bottom must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon).

6.4.13 All trench and foundation excavation bottoms must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon), prior to placing bedding materials, fill, steel, gravel or concrete.

6.5 Shrinkage

6.5.1 Shrinkage results when a volume of material removed at one density is compacted to a higher density. A shrinkage factor of up to 10 percent should be anticipated when excavating and compacting the upper 3 feet of existing earth materials on the site to an average relative compaction of 92 percent.

7.4.2 If import soils will be utilized within the area of proposed improvements, the soils must be placed uniformly and at equal thickness at the direction of the Geotechnical Engineer (a representative of Geocon West, Inc.). Soils can be borrowed from non-improvement areas and later replaced with imported soils.

6.6 Miscellaneous Foundations

6.6.1 Foundations for miscellaneous small structures, such as block walls up to 6 feet in height, planter walls or trash enclosures, may be supported on conventional foundations deriving support on a minimum of 12 inches of newly placed engineered fill which extends laterally at least 12 inches beyond the foundation area, or in the competent alluvial soils found at and below a depth of 1 foot, and should be deepened as necessary to maintain a minimum 12-inch embedment into the recommended bearing materials or a minimum 30 inch embedment below the lowest adjacent grade (whichever is deeper).

6.6.2 If the soils exposed in the excavation bottom are soft, compaction of the soft soils will be required prior to placing steel or concrete. Compaction of the foundation excavation bottom is typically accomplished with a compaction wheel or mechanical whacker and must be observed and approved by a Geocon representative. Miscellaneous foundations may be designed for a bearing value of 1,500 psf and should be a minimum of 12 inches in width, 30 inches in depth below the lowest adjacent grade and 12 inches into the recommended bearing material. The allowable bearing pressure may be increased by up to one-third for transient loads due to wind or seismic forces.

6.6.3 Foundation excavations should be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon West, Inc.), prior to the placement of reinforcing steel and concrete to verify that the excavations and exposed soil conditions are consistent with those anticipated.

6.7 Lateral Design

6.7.1 Resistance to lateral loading may be provided by friction acting at the base of foundations, slabs and by passive earth pressure. An allowable coefficient of friction of 0.25 may be used with the dead load forces in the undisturbed alluvial soils or engineered fill.

6.7.2 Passive earth pressure for the sides of foundations and slabs poured against the alluvial soils or properly compacted engineered fill may be computed as an equivalent fluid having a density of 180 pounds per cubic foot (pcf) with a maximum earth pressure of 1,800 pcf. When combining passive and friction for lateral resistance, the passive component should be reduced by one-third.

6.8 Friction Pile Design

6.8.1 Cast-in-place friction piles may be utilized for support of the proposed light pole structures, provided foundations derive support in the competent alluvium at or below a depth of 2 feet.

6.8.2 Friction piles should be a minimum of 18 inches in diameter and should be embedded a minimum of 10 feet into the recommended bearing materials. Where not protected from erosion or disturbance, the upper 18 inches of soil should be ignored when calculating axial and lateral capacity.

6.8.3 Friction piles may be designed based on a skin friction capacity of 160 psf. Uplift capacity may be assumed to be ⅔ the axial capacity in compression. Increases in frictional resistance may be available at deeper pile depths and Geocon should be contacted to provide updated values once a preliminary design is available.

6.8.4 Friction piles do not require the complete removal of all loose earth materials from the bottom of the excavation since the end-bearing capacity is not being considered for design. However, a cleanout of the excavation bottom will be required. A one-third increase in the capacity may be used for wind or seismic loads.

6.8.5 For design purposes, an allowable passive value for the soils may be assumed to be 180 psf per foot. To develop the full lateral value, provisions should be implemented to assure firm contact between the piles and the engineered fill and underlying alluvium. A one-third increase in the passive value may be used for wind or seismic loads. The allowable capacity may be doubled for isolated piles spaced more than three times the diameter on-center.

6.8.6 The maximum expected settlement for improvements supported on piles deriving support in the alluvial soils is expected to be less than ½ inch. The majority of settlement is anticipated to occur on initial application of loading during construction. Differential settlement is not expected to exceed ½ inch between adjacent foundations.

6.8.7 All drilled pile excavations should be continuously observed by personnel of this firm to verify adequate penetration into the recommended bearing materials. The capacity presented is based on the strength of the soils. The compressive and tensile strength of the pile sections should be checked to verify the structural capacity of the piles.

6.9 Deepened Foundation Installation

6.9.1 Casing may be required if caving is experienced in the drilled excavation. The contractor should have casing available prior to commencement of pile excavation. If casing is used, extreme care should be employed so that the pile is not pulled apart as the casing is withdrawn. At no time should the distance between the surface of the concrete and the bottom of the casing be less than 5 feet. Continuous observation of the drilling and pouring of the piles by the Geotechnical Engineer (a representative of Geocon West, Inc.), is required.

6.9.2 Friction piles do not require the complete removal of all loose earth materials from the bottom of the excavation since the end-bearing capacity is not being considered for design. However, a cleanout of the excavation bottom will be required.

6.9.3 Groundwater was not encountered in our field explorations, drilled to a maximum depth of 6 feet below the existing ground surface, and the reported historic high groundwater is greater than 40 feet below the ground surface. However, should groundwater or seepage be encountered during construction, pile excavations with more than 6 inches of standing water level require the use of a tremie to place the concrete into the bottom of the hole. A tremie shall consist of a water-tight tube, with a hopper at the top. The tube shall be equipped with a device that will close the discharge end and prevent water from entering the tube while it is being charged with concrete. The tremie shall be supported so as to permit free movement of the discharge end over the entire top surface of the work and to permit rapid lowering when necessary to retard or stop the flow of concrete. The discharge end shall be closed at the start of the work to prevent water entering the tube and shall be entirely sealed at all times, except when the concrete is being placed. The tremie tube shall be kept full of concrete. The flow shall be continuous until the work is completed, and the resulting concrete seal shall be monolithic and homogeneous. The tip of the tremie tube shall always be kept about 5 feet below the surface of the concrete and definite steps and safeguards should be taken to ensure that the tip of the tremie tube is never raised above the surface of the concrete.

6.9.4 A special concrete mix should be used for concrete to be placed below water. The design shall provide for concrete with a strength of 1,000 pounds per square inch (psi) over the initial job specification. An admixture that reduces the problem of segregation of paste/aggregates and dilution of paste shall be included. The slump shall be commensurate to any research report for the admixture, provided that it shall also be the minimum for a reasonable consistency for placing when water is present. Extreme care should be employed so that the pile is not pulled apart as the casing is withdrawn. At no time should the distance between the surface of the concrete and the bottom of the casing be less than 5 feet. Continuous observation of the drilling and pouring of the piles by a representative of this firm is required.

6.9.5 Closely spaced piles should be drilled and filled alternately, with the concrete permitted to set at least 8 hours before drilling an adjacent hole. Pile excavations should be filled with concrete as soon after drilling and inspection as possible; the holes should not be left open overnight unless approved by the Geotechnical Engineer.

6.10 Exterior Concrete Slabs-on-Grade

6.10.1 Concrete slabs for walkways or flatwork, not subject to traffic loads, should be at least 4 inches thick and reinforced with No. 4 steel reinforcing bars placed 16 inches on center in both horizontal directions, positioned near the slab midpoint. Prior to construction of slabs, the upper 12 inches of subgrade should be moistened to 2 to 3 percent above optimum moisture content and properly compacted to at least 92 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition). Crack control joints should be spaced at intervals not greater than 10 feet and should be constructed using saw-cuts or other methods as soon as practical following concrete placement. Crack control joints should extend a minimum depth of one-fourth the slab thickness. The project structural engineer should design construction joints as necessary.

6.10.2 Due to the expansive potential of the subgrade soils, the moisture content of the slab subgrade should be maintained and sprinkled as necessary to maintain a moist condition as would be expected in any concrete placement. Furthermore, consideration should be given to doweling slabs into adjacent curbs and foundations to minimize movements and offsets which could lead to a potential tripping hazard. As an alternative, the upper 24 inches of subgrade soils could be replaced with granular, non-expansive soils which will reduce the potential for movements and offsets. It may be feasible to reduce the slab thicknesses and/or reinforcing where slabs are underlain by non-expansive materials.

6.10.3 The recommendations of this report are intended to reduce the potential for cracking of slabs due to settlement. However, even with the incorporation of the recommendations presented herein, foundations, and slabs-on-grade may exhibit some cracking due to minor soil movement and/or concrete shrinkage. The occurrence of concrete shrinkage cracks is independent of the supporting soil characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, proper concrete placement and curing, and by the placement of crack control joints at periodic intervals, in particular, where re-entrant slab corners occur.

6.11 Preliminary Pavement Recommendations

6.11.1 Where new paving is to be placed, it is recommended that all existing fill and soft or unsuitable alluvial materials be excavated and properly recompacted for paving support. The client should be aware that excavation and compaction of all existing artificial fill and soft alluvium in the area of new paving is not required; however, paving constructed over existing unsuitable material may experience increased settlement and/or cracking, and may therefore have a shorter design life and increased maintenance costs. As a minimum, the upper 12 inches of paving subgrade should be scarified, moisture conditioned to 2 to 3 percent above optimum moisture content, and properly compacted to at least 92 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition).

6.11.2 The following pavement sections are based on site-specific R-Value of 4. Once site grading activities are complete an R-Value should be obtained by laboratory testing to confirm the properties of the soils serving as paving subgrade, prior to placing pavement. The use of a pavement interlayer or geogrid can help improve subgrade performance and reduce the pavement section design thickness. However, consideration should be given to future excavations that may occur in the paved area. Recommendations for the design of flexible pavement using a interlayer or geogrid can be provided upon request.

6.11.3 The Traffic Indices listed below are estimates. Geocon does not practice in the field of traffic engineering. The actual Traffic Index for each area should be determined by the project civil engineer. If pavement sections for Traffic Indices other than those listed below are required, Geocon should be contacted to provide additional recommendations. Pavement thicknesses were determined following procedures outlined in the *California Highway Design Manual* (Caltrans). It is anticipated that the majority of traffic will consist of automobile and large truck traffic.

PRELIMINARY PAVEMENT DESIGN SECTIONS

Location	Estimated Traffic Index (TI)	Asphalt Concrete (inches)	Class 2 Aggregate Base (inches)
Automobile Parking And Driveways	4.0	4.0	4.0
Trash Truck & Fire Lanes	7.0	4.0	16.0

6.11.4 Asphalt concrete should conform to Section 203-6 of the "*Standard Specifications for Public Works Construction"* (Green Book). Class 2 aggregate base materials should conform to Section 26-1.02A of the "*Standard Specifications of the State of California, Department of Transportation"* (Caltrans). The use of Crushed Miscellaneous Base in lieu of Class 2 aggregate base is acceptable. Crushed Miscellaneous Base should conform to Section 200-2.4 of the "*Standard Specifications for Public Works Construction"* (Green Book).

6.11.5 Unless specifically designed and evaluated by the project structural engineer, where concrete paving will be utilized for support of vehicles, it is recommended that the concrete be a minimum of 6 inches of concrete reinforced with No. 4 steel reinforcing bars placed 16 inches on center in both horizontal directions. Concrete paving supporting vehicular traffic should be underlain by a minimum of 4 inches of aggregate base and a properly compacted subgrade. The subgrade and base material should be compacted to 92 and 95 percent relative compaction, respectively, as determined by ASTM Test Method D 1557 (latest edition).

6.11.6 The performance of pavements is highly dependent upon providing positive surface drainage away from the edge of pavements. Ponding of water on or adjacent to the pavement will likely result in saturation of the subgrade materials and subsequent cracking, subsidence and pavement distress. If planters are planned adjacent to paving, it is recommended that the perimeter curb be extended at least 12 inches below the bottom of the aggregate base to minimize the introduction of water beneath the paving.

6.12 Temporary Excavations

6.12.1 Excavations less than 5 feet in height are anticipated during construction of proposed improvements. The excavations are expected to expose artificial fill and alluvial soils, which are suitable for vertical excavations up to 5 feet in height where loose soils or caving sands are not present, and where not surcharged by adjacent traffic or structures.

6.12.2 Vertical excavations greater than 5 feet or where surcharged by existing structures will require sloping or shoring measures in order to provide a stable excavation. Where sufficient space is available, temporary unsurcharged embankments could be sloped back at a uniform 1:1 slope gradient or flatter up to maximum height of 10 feet. A uniform slope does not have a vertical portion.

6.12.3 Where temporary slopes are utilized, the top of the slope should be barricaded to prevent vehicles and storage loads at the top of the slope within a horizontal distance equal to the height of the slope. If the temporary construction slopes are to be maintained during the rainy season, berms are suggested along the tops of the slopes where necessary to prevent runoff water from entering the excavation and eroding the slope faces. The soils exposed in the slopes should be inspected during excavation by our personnel so that modifications of the slopes can be made if variations in the soil conditions occur. All excavations should be stabilized within 30 days of initial excavation.

6.13 Stormwater Infiltration

6.13.1 During our site exploration performed on March 7, 2022, borings B1 and B3A were used to perform percolation testing. Boring B3A was located adjacent to boring B3 and was excavated to a depth of 3 feet for the purpose of percolation testing. Slotted casing was placed in the borings, and the annular space between the casing and excavation was filled with gravel. The borings were then filled with water to pre-saturate the soils. The casing was refilled with water and percolation test readings were performed after repeated flooding of the cased excavations. Based on the test results, the average infiltration rate (adjusted percolation rate), for the earth materials encountered, is provided in the following table. The field-measured percolation rate has been adjusted to infiltration rates in accordance with the *County of Orange Technical Guidance Document (TGD) for the Preparation of Conceptual/Preliminary and/or Project Water Quality Management Plans (December 2013)*. Additional correction factors may be required and should be applied by the engineer in responsible charge of the design of the stormwater infiltration system and based on applicable guidelines. Percolation test results are provided on Figures 3 and 4.

Boring	Soil Type	Infiltration Depth (ft)	Average Infiltration Rate (in / hour)
B1	Clayey Sand (SC)	3-5	2.41
B3A	Sandy Clay (CL)	1-3	0.21

6.13.2 The Orange County TGD indicates that a minimum infiltration rate of 0.3 inches per hour is required for infiltration to be considered feasible. Additionally, based on the predominately expansive clay soil conditions we encountered during our site exploration, shallow infiltration may saturate expansive soils. Based on these considerations, while infiltration at the location of B1 is considered feasible, it is recommended that infiltration occur at a minimum distance of 40 feet from existing or proposed foundations. Additionally, the project owner should understand that it is not our intent to completely prevent any soil movement as a result of stormwater infiltration as doing so would be prohibitive to the proposed project.

6.13.3 It is our further opinion that infiltration of stormwater at the locations tested will not induce excessive hydro-consolidation (see Figure B5), will not create a perched groundwater condition, will not affect soil structure interaction of existing or proposed foundations due to expansive soils, will not saturate soils supported by existing or proposed retaining walls, and will not increase the potential for liquefaction. Resulting settlements are anticipated to be less than ¼ inch, if any.

6.13.4 The infiltration system must be located such that the closest distance between an adjacent foundation is at least 40 feet in all directions from the zone of saturation. The zone of saturation may be assumed to project downward from the discharge of the infiltration facility at a gradient of 1:1. Additional property line or foundation setbacks may be required by the governing jurisdiction and should be incorporated into the stormwater infiltration system design as necessary.

6.13.5 Subsequent to the placement of the infiltration system, it is acceptable to backfill the resulting void space between the excavation sidewalls and the infiltration system with minimum two-sack slurry provided the slurry is not placed in the infiltration zone. It is recommended that pea gravel be utilized adjacent to the infiltration zone so communication of water to the soil is not hindered.

6.13.6 Due to the preliminary nature of the project at this time, the type of stormwater infiltration system and location of the stormwater infiltration systems has not yet been determined. The design drawings should be reviewed and approved by the Geotechnical Engineer. The installation of the stormwater infiltration system should be observed and approved by the Geotechnical Engineer (a representative of Geocon).

6.14 Surface Drainage

6.14.1 Proper surface drainage is critical to the future performance of the project. Uncontrolled infiltration of irrigation excess and storm runoff into the foundation supporting soils can adversely affect the performance of the planned improvements. Saturation of a soil can cause it to lose internal shear strength and increase its compressibility, resulting in a change in the original designed engineering properties. Proper drainage in building areas should be maintained at all times.

6.14.2 All site drainage should be collected and controlled in non-erosive drainage devices. Drainage should not be allowed to pond anywhere on the site, and especially not against any foundation or retaining wall. The site should be graded and maintained such that surface drainage is directed away from structures in accordance with 2019 CBC 1804.4 or other applicable standards. In addition, drainage should not be allowed to flow uncontrolled over any descending slope. Discharge from downspouts, roof drains and scuppers are not recommended onto unprotected soils within five feet of the building perimeter. Planters which are located adjacent to foundations should be sealed to prevent moisture intrusion into the soils providing foundation support. Landscape irrigation is not recommended within five feet of the building perimeter footings except when enclosed in protected planters.

6.14.3 Positive site drainage should be provided away from structures, pavement, and the tops of slopes to swales or other controlled drainage structures. The building pad and pavement areas should be fine graded such that water is not allowed to pond.

6.14.4 Landscaping planters immediately adjacent to paved areas are not recommended due to the potential for surface or irrigation water to infiltrate the pavement's subgrade and base course. Either a subdrain, which collects excess irrigation water and transmits it to drainage structures, or an impervious above-grade planter boxes should be used. In addition, where landscaping is planned adjacent to the pavement, it is recommended that consideration be given to providing a cutoff wall along the edge of the pavement that extends at least 12 inches below the base material.

6.15 Plan Review

6.15.1 Grading, foundation, and, if applicable, shoring plans should be reviewed by the Geotechnical Engineer prior to finalization to verify that the plans have been prepared in substantial conformance with the recommendations of this report and to provide additional analyses or recommendations, if necessary.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon West, Inc. should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon West, Inc.

2. This report is issued with the understanding that it is the responsibility of the owner, or of his representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

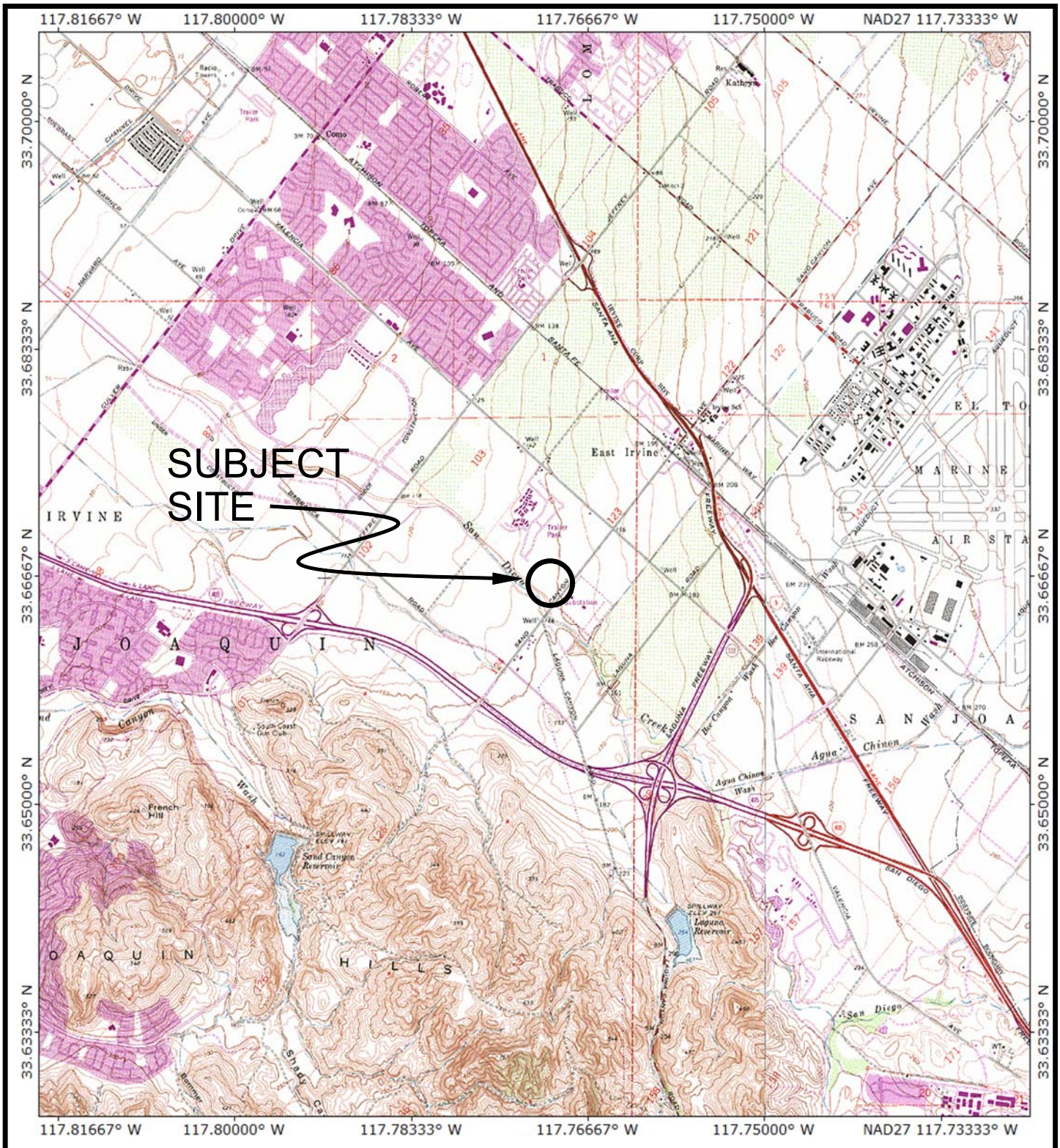
3. The findings of this report are valid as of the date of this report. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

4. The firm that performed the geotechnical investigation for the project should be retained to provide testing and observation services during construction to provide continuity of geotechnical interpretation and to check that the recommendations presented for geotechnical aspects of site development are incorporated during site grading, construction of improvements, and excavation of foundations. If another geotechnical firm is selected to perform the testing and observation services during construction operations, that firm should prepare a letter indicating their intent to assume the responsibilities of project geotechnical engineer of record. A copy of the letter should be provided to the regulatory agency for their records. In addition, that firm should provide revised recommendations concerning the geotechnical aspects of the proposed development, or a written acknowledgement of their concurrence with the recommendations presented in our report. They should also perform additional analyses deemed necessary to assume the role of Geotechnical Engineer of Record.

LIST OF REFERENCES

U.S. Geological Survey, 1999, *Preliminary Digital Geologic Map of the Santa Ana 30' x 60' Quadrangle, Southern California, Version 1.0,* Open File Report 99-172.

California Department of Conservation, Division of Mines and Geology, 2001, *Seismic Hazard Evaluation of the Tustin 7.5-Minute Quadrangle, Orange County, California,* Open File Report 97-20.



U.S.G.S. TOPOGRAPHIC MAPS, 7.5 MINUTE SERIES, TUSTIN, CA QUADRANGLE

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VICINITY MAP

OAK CREEK COMMUNITY PARK
15616 OAK VALLEY DRIVE
IRVINE, CALIFORNIA

APRIL 2022	PROJECT NO. W1035-88-01	FIG. 1



LEGEND

- B5 — Approximate Location of Boring
- B3A — Approximate Location of Percolation Test Boring
- Approximate Limits of Proposed Improvements
- Approximate Location of Existing Structures/Improvements
- Approximate Limits of Proposed Project

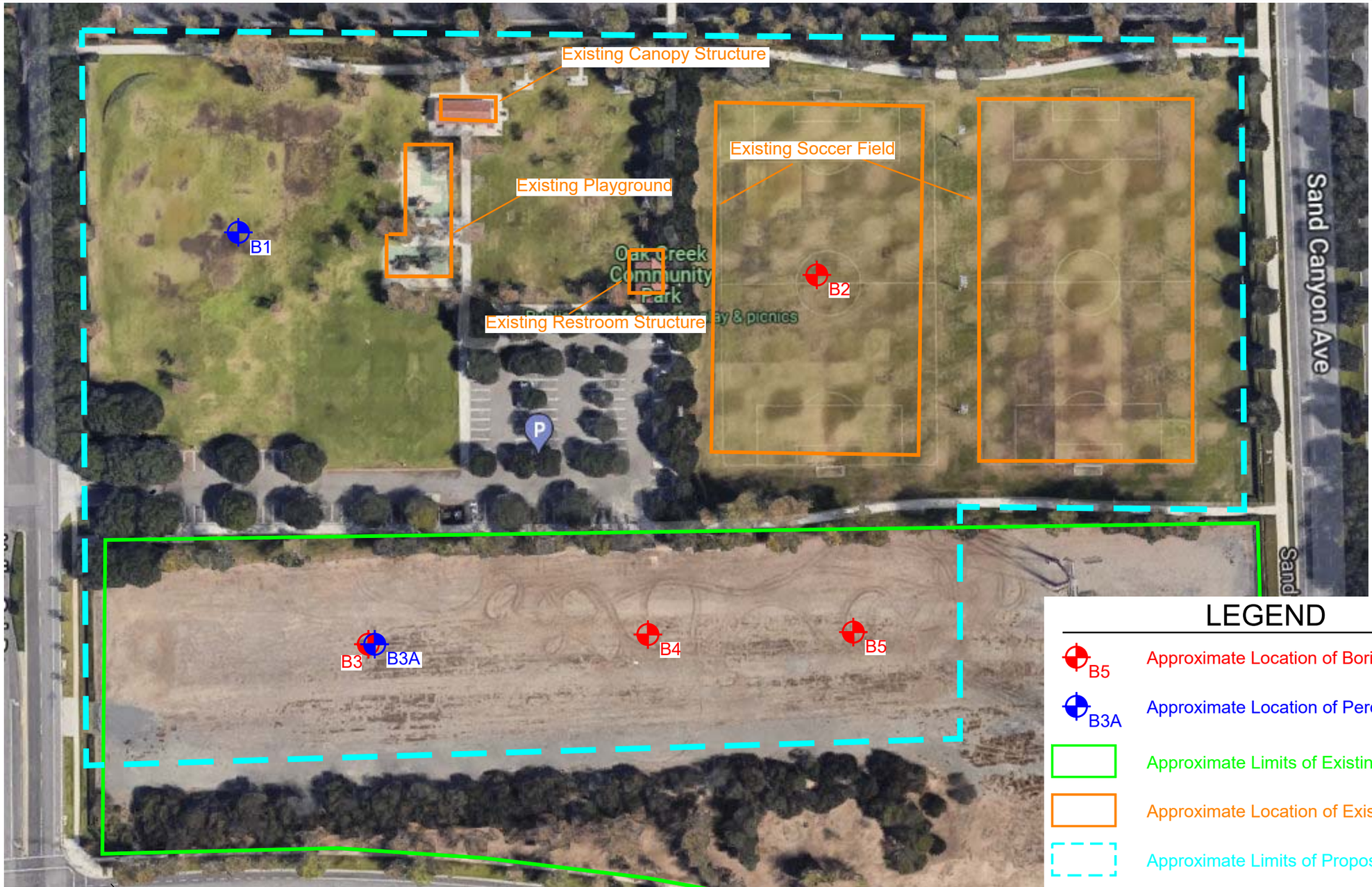
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SITE PLAN

OAK CREEK COMMUNITY PARK
15616 OAK VALLEY DRIVE
IRVINE, CALIFORNIA

APRIL 2022 | PROJECT NO. W1035-88-01 | FIG. 2A



LEGEND

- B5 — Approximate Location of Boring
- B3A — Approximate Location of Percolation Test Boring
- Approximate Limits of Existing SCE Easement
- Approximate Location of Existing Structures/Improvements
- Approximate Limits of Proposed Project

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EXISTING CONDITIONS

OAK CREEK COMMUNITY PARK
15616 OAK VALLEY DRIVE
IRVINE, CALIFORNIA

APRIL 2022 | PROJECT NO. W1035-88-01 | FIG. 2A

PERCOLATION TEST DATA SHEET

Project:	Oak Creek Park	Project No:	W1035-88-01	Date:	3/7/2022
Test Hole No:	B1	Tested By:	JS		
Depth of Test Hole, D_T:	5	USCS Soil Classification:	CL / SC		
Test Hole Dimensions (inches)			Length	Width	
Diameter (if round) =	4	Sides (if rectangular) =	---	---	

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Δt Time Interval (min)	D_0 Initial Depth to Water (in)	D_f Final Depth to Water (in)	ΔD Change in Water Level (in)	Greater than or Equal to 6"? (y/n)
1	11:59	12:24	25	37.8	53.6	15.8	y
2	12:32	12:57	25	39.0	52.7	13.7	y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements, taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min)	D_0 Initial Depth to Water (in)	D_f Final Depth to Water (in)	ΔD Change in Water Level (in)	Percolation Rate (min/in)
1	12:59	13:09	10	39.0	46.9	7.9	1.26
2	13:11	13:21	10	36.6	46.0	9.4	1.07
3	13:23	13:33	10	36.6	45.7	9.1	1.10
4	13:35	13:45	10	36.6	45.4	8.8	1.14
5	13:46	13:56	10	36.7	45.4	8.6	1.16
6	13:59	14:09	10	36.6	44.8	8.2	1.23
7							
8							

Infiltration Rate Calculation:

Time Interval, Δt =	10	minutes	Ho =	23.4	inches
Final Depth to Water, Df =	44.8	inches	Hf =	15.2	inches
Test Hole Radius, r =	2	inches	ΔH =	8.2	inches
Initial Depth to Water, Do =	36.6	inches	Havg =	19.3	inches
Total Depth of Test Hole, DT =	60.0	inches			

$$I_t = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Infiltration Rate, It = **2.41** inches/hour

Figure 3

PERCOLATION TEST DATA SHEET

Project:	Oak Creek Park	Project No:	W1035-88-01	Date:	3/7/2022
Test Hole No:	B3A	Tested By:	JS		
Depth of Test Hole, D_T:	3	USCS Soil Classification:	CL		
Test Hole Dimensions (inches)			Length	Width	
Diameter (if round) =	4	Sides (if rectangular) =	---	---	

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Δt Time Interval (min)	D_0 Initial Depth to Water (in)	D_f Final Depth to Water (in)	ΔD Change in Water Level (in)	Greater than or Equal to 6"? (y/n)
1	9:42	10:12	30	15.8	22.2	6.4	y
2	10:14	10:44	30	16.4	20.5	4.1	n

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements, taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min)	D_0 Initial Depth to Water (in)	D_f Final Depth to Water (in)	ΔD Change in Water Level (in)	Percolation Rate (min/in)
1	10:46	11:16	30	14.9	18.6	3.7	8.06
2	11:16	11:56	40	11.4	17.3	5.9	6.80
3	11:56	12:34	38	17.3	20.0	2.8	13.77
4	12:34	13:04	30	20.0	21.6	1.6	19.23
5	13:05	13:37	32	10.7	15.5	4.8	6.67
6	13:37	14:11	34	15.5	18.2	2.8	12.32
7	14:11	14:41	30	18.2	20.0	1.8	16.67
8	14:44	15:14	30	13.0	15.7	2.8	10.87
9	15:14	15:44	30	15.7	17.9	2.2	13.89

Infiltration Rate Calculation:

Time Interval, Δt =	30	minutes	Ho =	20.3	inches
Final Depth to Water, Df =	17.9	inches	Hf =	18.1	inches
Test Hole Radius, r =	2	inches	ΔH =	2.2	inches
Initial Depth to Water, Do =	15.7	inches	Havg =	19.2	inches
Total Depth of Test Hole, DT =	36.0	inches			

$$I_t = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Infiltration Rate, It = **0.21** inches/hour

Figure 4

APPENDIX A

APPENDIX A

FIELD INVESTIGATION

The site was explored on March 7, 2022, by excavating five 3¼-inch diameter borings to depths ranging from approximately 5 to 6 feet below the existing ground surface using manual hand auger equipment and digging tools. An additional boring (B3A) was excavated near boring location B3 for percolation testing. Representative and relatively undisturbed samples were obtained by driving a 3-inch O. D., California Modified Sampler into the "undisturbed" soil mass with blows from a slide hammer. The California Modified Sampler was equipped with 1-inch high by 2⅜-inch diameter brass sampler rings to facilitate soil removal and testing. Bulk samples were also obtained.

The soil conditions encountered in the borings were visually examined, classified and logged in general accordance with the Unified Soil Classification System (USCS). The logs of the borings are presented on Figures A1 through A6. The logs depict the soil and geologic conditions encountered and the depth at which samples were obtained. The logs also include our interpretation of the conditions between sampling intervals. Therefore, the logs contain both observed and interpreted data. We determined the lines designating the interface between soil materials on the logs using visual observations, penetration rates, excavation characteristics and other factors. The transition between materials may be abrupt or gradual. Where applicable, the boring logs were revised based on subsequent laboratory testing. The locations of the borings are shown on the Site Plan (see Figures 2A and 2B).

PROJECT NO. W1035-88-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING 1** ELEV. (MSL.) -- DATE COMPLETED **3/7/2022** EQUIPMENT **HAND AUGER** BY: **JS** MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT)*	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	BULK 0-3'			CL	**ALLUVIUM** Clay with sand, firm, moist, brown, fine-grained, trace white stringers.			
2	B1@2.5'				-increase in sand, increase in white stringers.		107.0	19.6
4				SC	Clayey Sand, medium dense, moist, strong brown, fine- to medium-grained.			
	B1@4.5'				-increase in clay		111.8	14.7
					Total depth of boring: 5 feet No Fill. No groundwater encountered. Percolation testing performed. NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.			

Figure A1,
Log of Boring 1, Page 1 of 1

W1035-88-01 BORING LOGS.GPJ

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL ◧ ... STANDARD PENETRATION TEST ■ ... DRIVE SAMPLE (UNDISTURBED)

⊠ ... DISTURBED OR BAG SAMPLE ◪ ... CHUNK SAMPLE ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. W1035-88-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING 2** ELEV. (MSL.) -- DATE COMPLETED **3/7/2022** EQUIPMENT **HAND AUGER** BY: **JS** MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT)*	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	BULK 0-5'			CL	**ARTIFICIAL FILL** Silty Sand Substrate			
2	B2@2.5'			SC	**ALLUVIUM** Clay, firm, moist, brown, some fine-grained sand. Clayey Sand, medium dense, moist, brown, fine- to medium-grained.		105.7	20.8
4	B2@5'			CL	Clay and Sand, firm, moist, dark yellowish brown, fine- to medium-grained sand, trace to some white stringers.		97.5	23.6
6					Total depth of boring: 6 feet Fill to 0.5 feet. No groundwater encountered. Backfilled with soil cuttings and tamped. NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.			

Figure A2,
Log of Boring 2, Page 1 of 1

W1035-88-01 BORING LOGS.GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. W1035-88-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING 3** ELEV. (MSL.) -- DATE COMPLETED **3/7/2022** EQUIPMENT **HAND AUGER** BY: **JS** MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT)*	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	BULK 0-5'				**ARTIFICIAL FILL** Sandy Clay, firm, slightly moist, brown, fine-grained.			
2	B3@2.5'			CL	**ALLUVIUM** Sandy Clay, firm to stiff, slightly moist, brown to dark brown, fine-grained, trace white stringers.		101.6	15.3
4	B3@5'				-stiff to hard, dark yellowish brown, increase in white stringers.		107.3	13.3
					Total depth of boring: 5'9" feet Fill to 0.5 feet. No groundwater encountered. Backfilled with soil cuttings and tamped. NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.			

W1035-88-01 BORING LOGS.GPJ

Figure A3,
Log of Boring 3, Page 1 of 1

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL ◧ ... STANDARD PENETRATION TEST ■ ... DRIVE SAMPLE (UNDISTURBED)

⊠ ... DISTURBED OR BAG SAMPLE ◪ ... CHUNK SAMPLE ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. W1035-88-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING 3A** ELEV. (MSL.) -- DATE COMPLETED **3/7/2022** EQUIPMENT **HAND AUGER** BY: **JS**	PENETRATION RESISTANCE (BLOWS/FT)*	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0					**ARTIFICIAL FILL** Sandy Clay, firm, slightly moist, dark brown, fine-grained.			
2					**ALLUVIUM** Sandy Clay, firm to stiff, moist, brown to dark brown, fine-grained.			
					Total depth of boring: 3 feet Fill to 0.5 feet. No groundwater encountered. Percolation testing performed. Backfilled with soil cuttings and tamped. NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.			

W1035-88-01 BORING LOGS.GPJ

Figure A4,
Log of Boring 3A, Page 1 of 1

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL ◧ ... STANDARD PENETRATION TEST ■ ... DRIVE SAMPLE (UNDISTURBED)

⊠ ... DISTURBED OR BAG SAMPLE ◪ ... CHUNK SAMPLE ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. W1035-88-01

BORING 4

ELEV. (MSL.) -- DATE COMPLETED **3/7/2022**

EQUIPMENT **HAND AUGER** BY: **JS**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT)*	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	BULK 0-3'				**ARTIFICIAL FILL** Clay with Sand, firm, slightly moist, brown, fine-grained.			
2	B4@2.5'			CL	**ALLUVIUM** Clay with Sand, firm, moist, brown to dark brown, fine-grained. -increase in sand, some white stringers.		100.3	23.0
4					-clayey sand interbed.			
6	B4@5'			CL	Sandy Clay, stiff, slightly moist, brown, fine-grained, some white stringers. Total depth of boring: 6 feet Fill to 0.5 feet. No groundwater encountered. Backfilled with soil cuttings and tamped. NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.		109.6	11.6

W1035-88-01 BORING LOGS.GPJ

Figure A5,
Log of Boring 4, Page 1 of 1

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL ◧ ... STANDARD PENETRATION TEST ■ ... DRIVE SAMPLE (UNDISTURBED)

⊠ ... DISTURBED OR BAG SAMPLE ◪ ... CHUNK SAMPLE ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. W1035-88-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING 5** ELEV. (MSL.) -- DATE COMPLETED **3/7/2022** EQUIPMENT **HAND AUGER** BY: **JS**	PENETRATION RESISTANCE (BLOWS/FT)*	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0	BULK 0-3'				**ARTIFICIAL FILL** Clay with Sand, firm, slightly moist, brown, fine-grained.			
2	B5@2.5'			CL	**ALLUVIUM** Clay with Sand, firm to stiff, moist, brown to dark brown, fine-grained. -increase in sand, trace white stringers.		105.6	20.6
4	B5@5'			CL	Clay and Sand, stiff, slightly moist, yellowish brown, fine-grained, some white stringers.		105.5	12.6
					Total depth of boring: 5'11" feet Fill to 0.5 feet. No groundwater encountered. Backfilled with soil cuttings and tamped. NOTE: The stratification lines presented herein represent the approximate boundary between earth types; the transitions may be gradual.			

W1035-88-01 BORING LOGS.GPJ

Figure A6,
Log of Boring 5, Page 1 of 1

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL
◧ ... STANDARD PENETRATION TEST
■ ... DRIVE SAMPLE (UNDISTURBED)
⊠ ... DISTURBED OR BAG SAMPLE
◪ ... CHUNK SAMPLE
▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

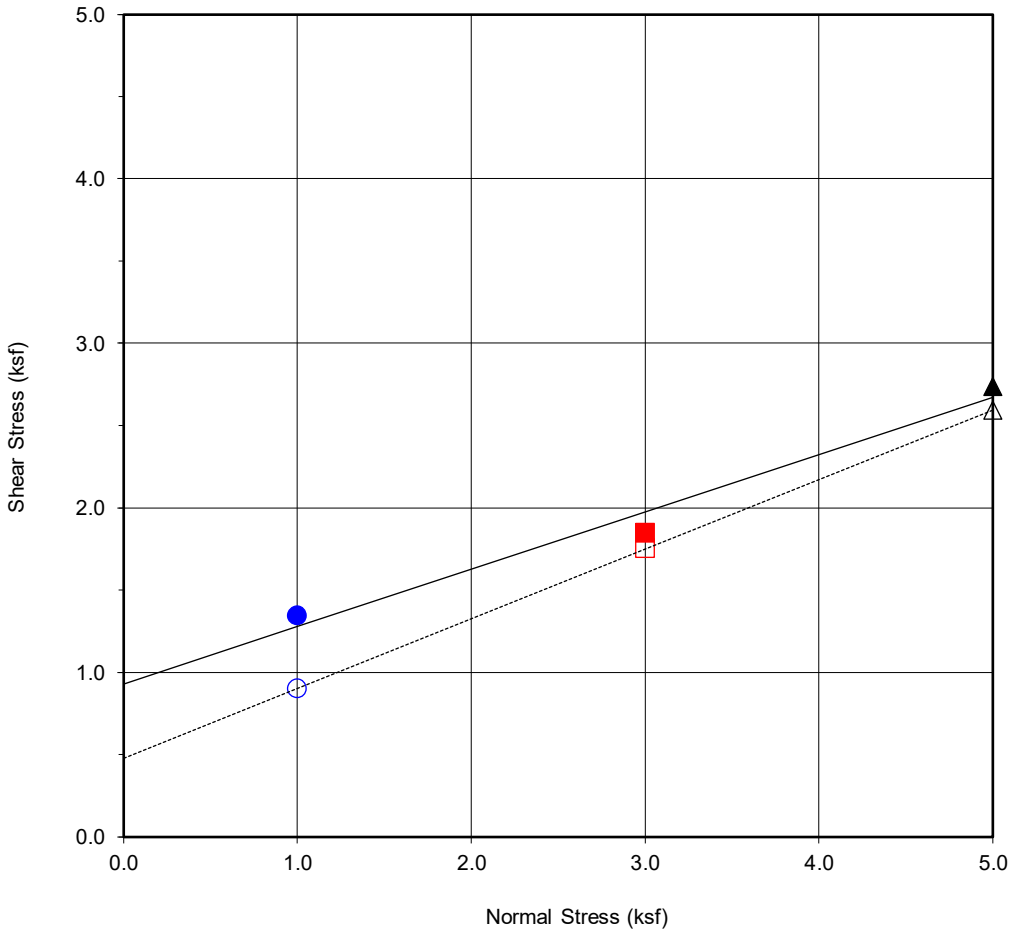
GEOCON

APPENDIX B

APPENDIX B

LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of the International ASTM, or other suggested procedures. Selected samples were tested for direct shear strength, consolidation characteristics, expansion index, water-soluble sulfate, R-Value, in-place dry density and moisture content. The results of the laboratory tests are summarized in Figures B1 through B1. The in-place dry density and moisture content of the samples tested are presented on the boring logs, Appendix A.



Boring No.	**B-1**
Sample No.	**B1@2.5'**
Depth (ft)	**2.5'**
Sample Type:	Ring

Soil Identification:		
Clay with Sand (CL)		
Strength Parameters		
	C (psf)	ϕ (^{o})
Peak	932	19.2
Ultimate	479	22.9

Normal Strest (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 1.34	■ 1.85	▲ 2.74
Shear Stress @ End of Test (ksf)	○ 0.90	□ 1.75	△ 2.59
Deformation Rate (in./min.)	0.01	0.01	0.01
Initial Sample Height (in.)	1.0	1.0	1.0
Ring Inside Diameter (in.)	2.375	2.375	2.375
Initial Moisture Content (%)	20.3	20.4	20.9
Initial Dry Density (pcf)	107.1	107.4	104.6
Initial Degree of Saturation (%)	95.3	96.8	92.4
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	23.2	22.4	22.9

GEOCON

DIRECT SHEAR TEST RESULTS

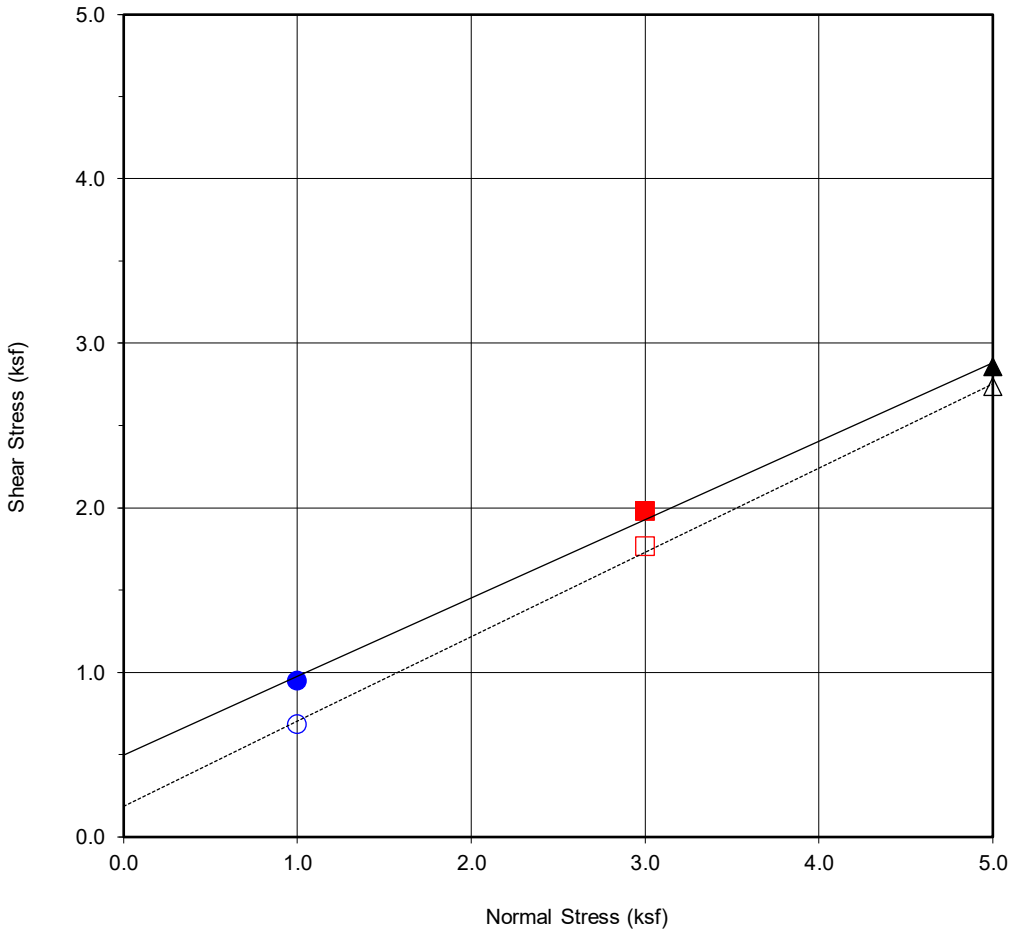
Consolidated Drained ASTM D-3080

Checked by: JS

Project No.: W1035-88-01

Oak Creek Community Park
15616 Oak Valley Drive
Irvine, California

April 2022 Figure B1



Boring No.	**B-1**
Sample No.	**B1@4'**
Depth (ft)	**4'**
Sample Type:	Ring

Soil Identification:		
Sandy Clay (CL)		
Strength Parameters		
	C (psf)	ϕ (^{o})
Peak	497	25.5
Ultimate	189	27.2

Normal Strest (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.95	■ 1.98	▲ 2.86
Shear Stress @ End of Test (ksf)	○ 0.68	□ 1.76	△ 2.74
Deformation Rate (in./min.)	0.01	0.01	0.01
Initial Sample Height (in.)	1.0	1.0	1.0
Ring Inside Diameter (in.)	2.375	2.375	2.375
Initial Moisture Content (%)	19.9	21.6	17.5
Initial Dry Density (pcf)	107.0	105.2	108.9
Initial Degree of Saturation (%)	93.3	96.8	86.5
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	25.3	24.2	20.6

GEOCON

DIRECT SHEAR TEST RESULTS

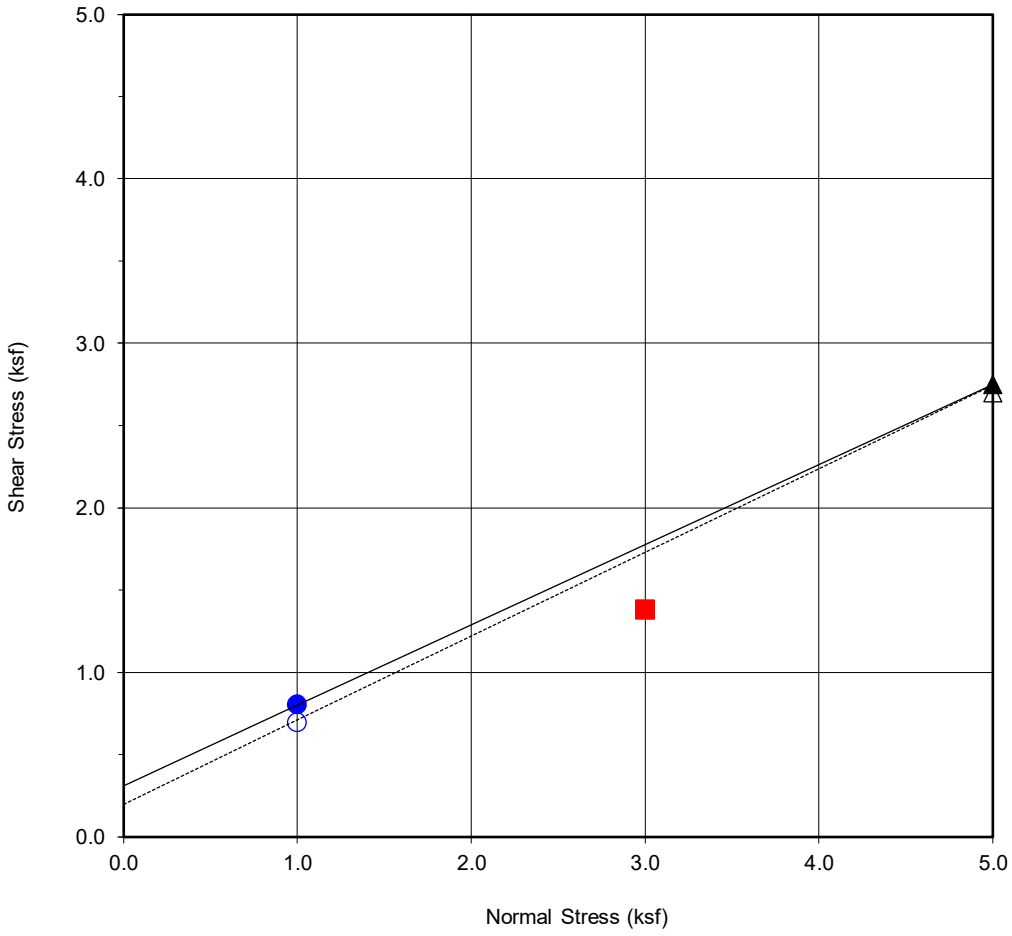
Consolidated Drained ASTM D-3080

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Project No.: W1035-88-01

Oak Creek Community Park
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April 2022 Figure B2



Boring No.	**B-4**
Sample No.	**B4@5'**
Depth (ft)	**5'**
Sample Type:	Ring

Soil Identification:		
Sandy Clay (CL)		
Strength Parameters		
	C (psf)	ϕ (^{o})
Peak	313	26.0
Ultimate	200	27.0

Normal Strest (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.80	■ 1.38	▲ 2.75
Shear Stress @ End of Test (ksf)	○ 0.70	□ 1.38	△ 2.70
Deformation Rate (in./min.)	0.01	0.01	0.01
Initial Sample Height (in.)	1.0	1.0	1.0
Ring Inside Diameter (in.)	2.375	2.375	2.375
Initial Moisture Content (%)	19.0	21.8	21.1
Initial Dry Density (pcf)	101.3	94.0	101.1
Initial Degree of Saturation (%)	77.3	74.2	85.4
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	27.8	27.1	22.6

GEOCON

DIRECT SHEAR TEST RESULTS

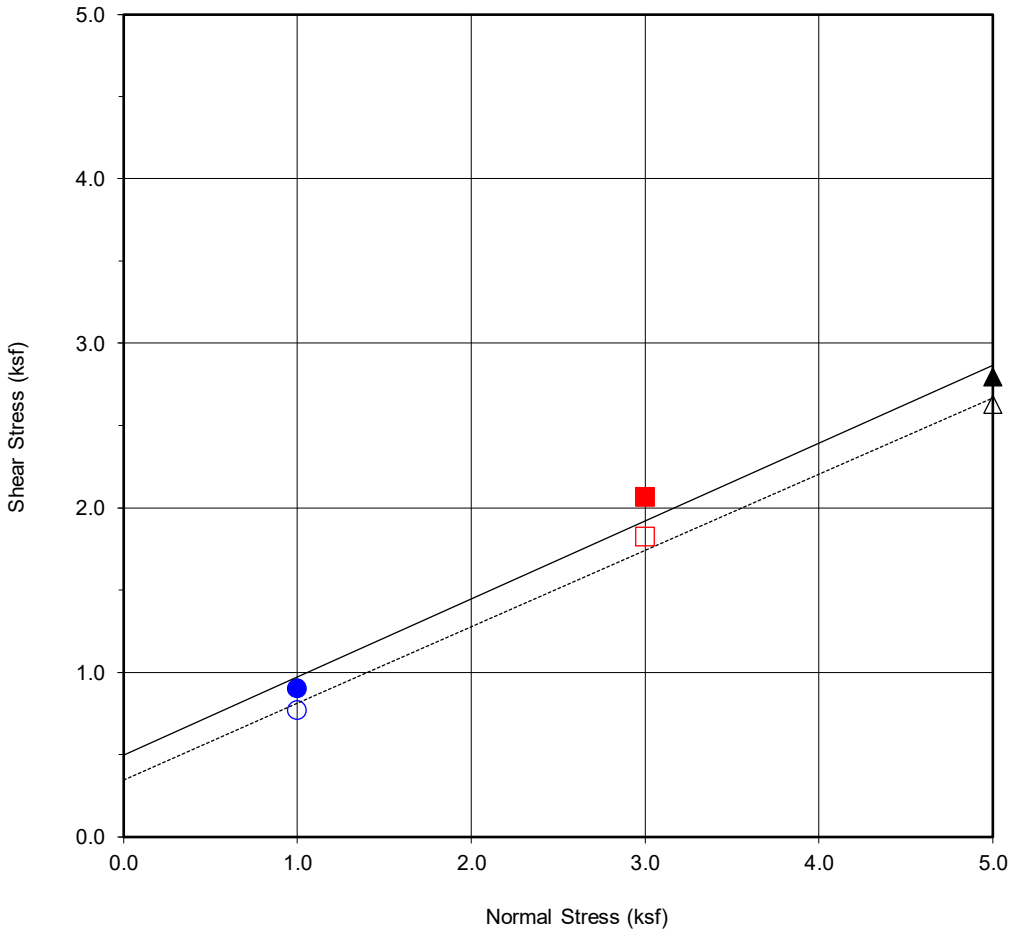
Consolidated Drained ASTM D-3080

Checked by: JS

Project No.: W1035-88-01

Oak Creek Community Park
15616 Oak Valley Drive
Irvine, California

April 2022 Figure B3



Boring No.	**B-5**
Sample No.	**B5@2.5'**
Depth (ft)	**2.5'**
Sample Type:	Ring

Soil Identification:		
Clay and Sand (CL)		
Strength Parameters		
	C (psf)	ϕ (^{o})
Peak	498	25.4
Ultimate	345	24.9

Normal Strest (kip/ft2)	1	3	5
Peak Shear Stress (kip/ft²)	● 0.90	■ 2.06	▲ 2.80
Shear Stress @ End of Test (ksf)	○ 0.77	□ 1.82	△ 2.63
Deformation Rate (in./min.)	0.01	0.01	0.01
Initial Sample Height (in.)	1.0	1.0	1.0
Ring Inside Diameter (in.)	2.375	2.375	2.375
Initial Moisture Content (%)	21.2	22.1	20.8
Initial Dry Density (pcf)	105.1	103.3	104.5
Initial Degree of Saturation (%)	94.9	94.3	91.7
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	24.3	24.4	22.6

GEOCON

DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

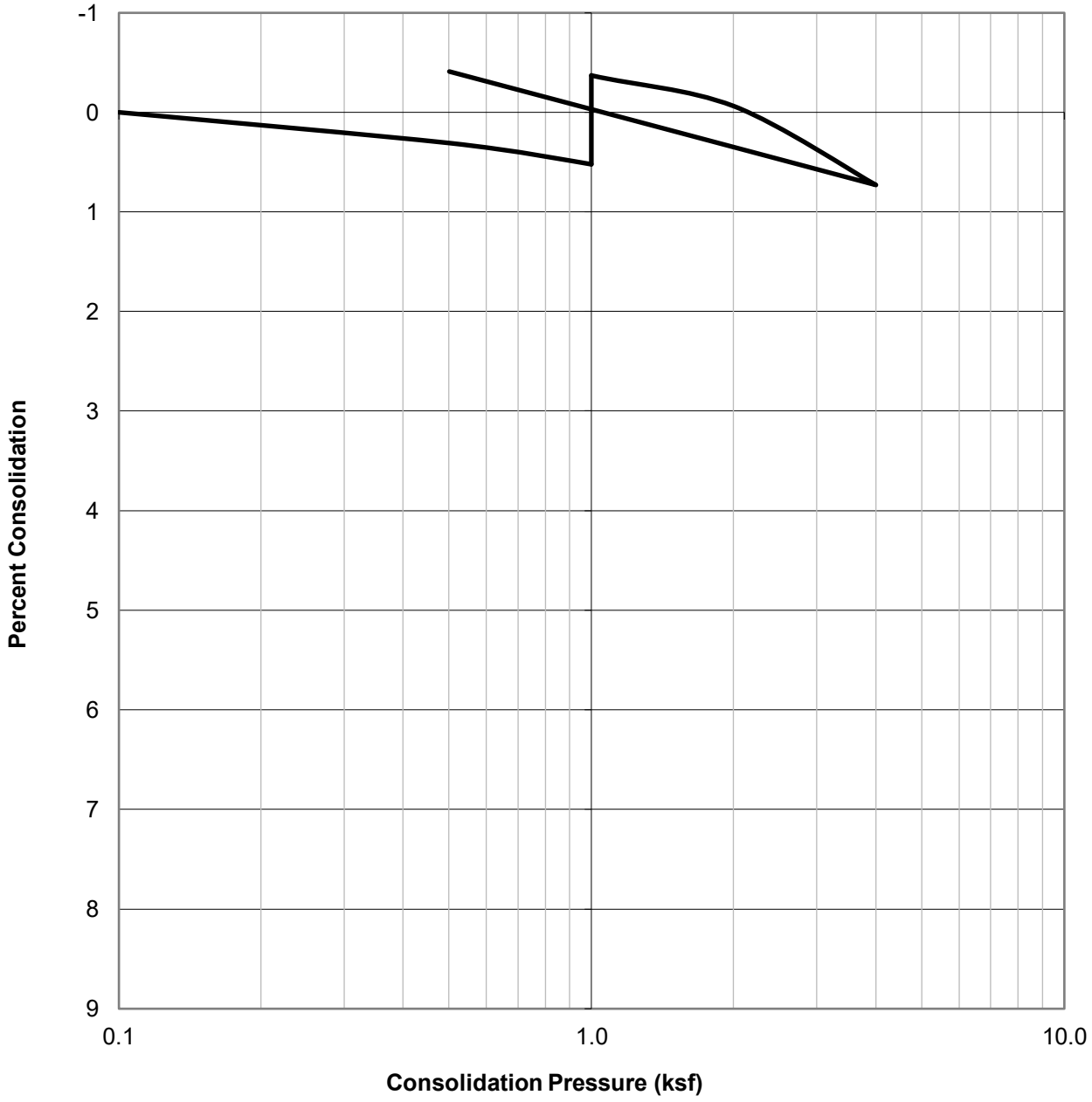
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Project No.: W1035-88-01

Oak Creek Community Park
15616 Oak Valley Drive
Irvine, California

April 2022 Figure B4

WATER ADDED AT 1.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B1@4.5'	Clay and Clayey Sand (CL)	109.2	18.9	21.7

GEOCON

CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by: JS

Project No.: W1035-88-01

Oak Creek Community Park
15616 Oak Valley Drive
Irvine, California

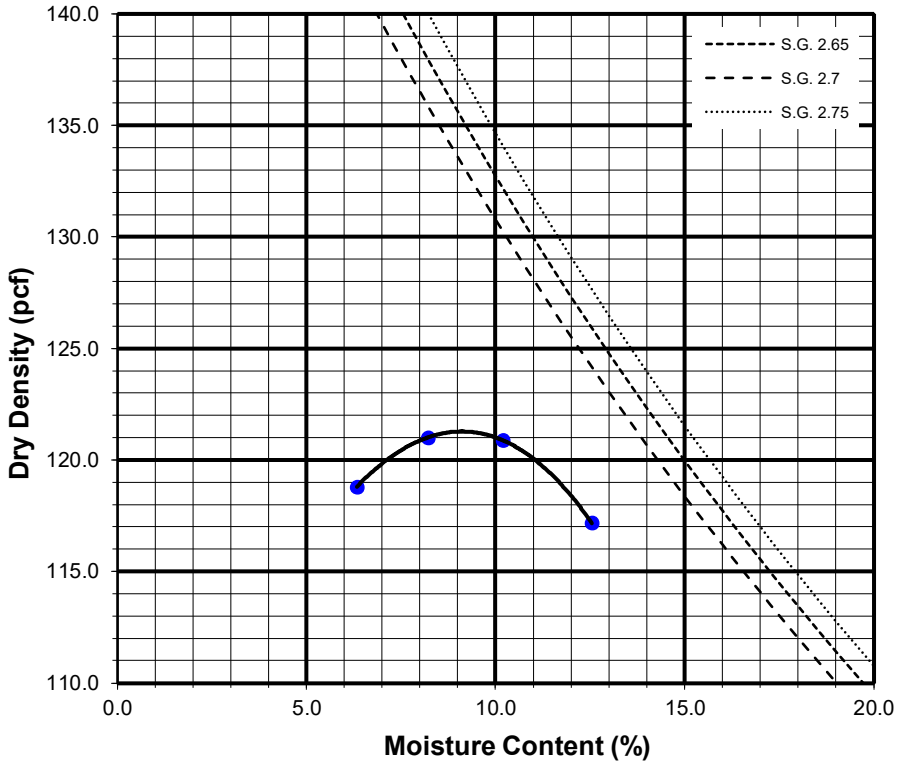
April 2022 Figure B5

Sample No:

B1@0-3'	Clay with Sand (CL), brown

TEST NO.		1	2	3	4	5	6
Wt. Compacted Soil + Mold	(g)	6274	6294	6260	6190		
Weight of Mold	(g)	4282	4282	4282	4282		
Net Weight of Soil	(g)	1992	2012	1978	1908		
Wet Weight of Soil + Cont.	(g)	2401.2	2389.5	2389.1	2371.3		
Dry Weight of Soil + Cont.	(g)	2179.2	2203.5	2239.0	2254.5		
Weight of Container	(g)	409.8	378.7	411.8	409.8		
Moisture Content	(%)	12.5	10.2	8.2	6.3		
Wet Density	(pcf)	131.9	133.2	131.0	126.3		
Dry Density	(pcf)	117.2	120.9	121.0	118.8		

Maximum Dry Density (pcf)	**121.8**	**Optimum Moisture Content (%)**	**9.2**



Preparation Method: A

GEOCON

COMPACTION CHARACTERISTICS USING MODIFIED EFFORT TEST RESULTS

ASTM D-1557

Checked by: JS

Project No.: W1035-88-01

Oak Creek Community Park
15616 Oak Valley Drive
Irvine, California

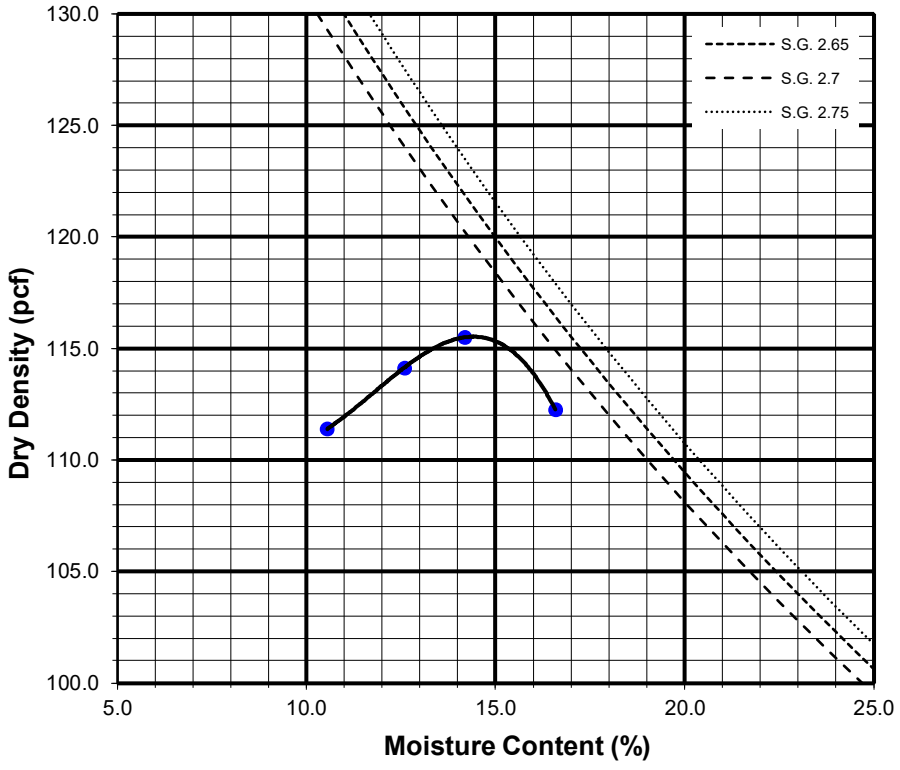
April 2022 Figure B6

Sample No:

B4+B5@0-3'	Clay with Sand (CL), dark brown

TEST NO.		1	2	3	4	5	6
Wt. Compacted Soil + Mold	(g)	6160	6241	6292	6277		
Weight of Mold	(g)	4300	4300	4300	4300		
Net Weight of Soil	(g)	1860	1941	1992	1977		
Wet Weight of Soil + Cont.	(g)	500.0	500.0	500.0	500.0		
Dry Weight of Soil + Cont.	(g)	452.3	444.1	437.9	428.9		
Weight of Container	(g)	0.0	0.0	0.0	0.0		
Moisture Content	(%)	10.5	12.6	14.2	16.6		
Wet Density	(pcf)	123.1	128.5	131.9	130.9		
Dry Density	(pcf)	111.4	114.1	115.5	112.3		

Maximum Dry Density (pcf)	**116.5**	**Optimum Moisture Content (%)**	**14.2**



Preparation Method: A

GEOCON

COMPACTION CHARACTERISTICS USING MODIFIED EFFORT TEST RESULTS

ASTM D-1557

Checked by: JS

Project No.: W1035-88-01

Oak Creek Community Park
15616 Oak Valley Drive
Irvine, California

April 2022 Figure B7

B1@0-3'

MOLDED SPECIMEN		BEFORE TEST	AFTER TEST
Specimen Diameter	(in.)	4.0	4.0
Specimen Height	(in.)	1.0	1.1
Wt. Comp. Soil + Mold	(gm)	557.6	610.5
Wt. of Mold	(gm)	176.5	176.5
Specific Gravity	(Assumed)	2.7	2.7
Wet Wt. of Soil + Cont.	(gm)	707.8	610.5
Dry Wt. of Soil + Cont.	(gm)	677.1	342.1
Wt. of Container	(gm)	407.8	176.5
Moisture Content	(%)	11.4	26.9
Wet Density	(pcf)	115.0	130.7
Dry Density	(pcf)	103.2	103.1
Void Ratio		0.6	0.8
Total Porosity		0.4	0.5
Pore Volume	(cc)	80.3	104.9
Degree of Saturation	(%) [S_{meas}]	49.0	87.6

Date	Time	Pressure (psi)	Elapsed Time (min)	Dial Readings (in.)
3/29/2022	10:00	1.0	0	0.3632
3/29/2022	10:10	1.0	10	0.3626
Add Distilled Water to the Specimen				
3/30/2022	10:00	1.0	1430	0.4814
3/30/2022	11:00	1.0	1490	0.4814

Expansion Index (EI meas) =	118.8
Expansion Index (Report) =	**119**

Expansion Index, EI_{50}	CBC CLASSIFICATION *	UBC CLASSIFICATION **
0-20	Non-Expansive	Very Low
21-50	Expansive	Low
51-90	Expansive	Medium
91-130	Expansive	High
>130	Expansive	Very High

* Reference: 2019 California Building Code, Section 1803.5.3

** Reference: 1997 Uniform Building Code, Table 18-I-B.

GEOCON

EXPANSION INDEX TEST RESULTS

ASTM D-4829

Checked by: JS

Project No.: W1035-88-01

Oak Creek Community Park
15616 Oak Valley Drive
Irvine, California

April 2022 Figure B8

B4+B5@0-3'

MOLDED SPECIMEN		BEFORE TEST	AFTER TEST
Specimen Diameter	(in.)	4.0	4.0
Specimen Height	(in.)	1.0	1.1
Wt. Comp. Soil + Mold	(gm)	574.9	631.3
Wt. of Mold	(gm)	199.4	199.4
Specific Gravity	(Assumed)	2.7	2.7
Wet Wt. of Soil + Cont.	(gm)	499.4	631.3
Dry Wt. of Soil + Cont.	(gm)	465.1	332.6
Wt. of Container	(gm)	199.4	199.4
Moisture Content	(%)	12.9	29.9
Wet Density	(pcf)	113.3	130.1
Dry Density	(pcf)	100.3	100.2
Void Ratio		0.7	0.9
Total Porosity		0.4	0.5
Pore Volume	(cc)	83.8	106.3
Degree of Saturation	(%) [S_{meas}]	51.6	93.4

Date	Time	Pressure (psi)	Elapsed Time (min)	Dial Readings (in.)
3/29/2022	10:00	1.0	0	0.2625
3/29/2022	10:10	1.0	10	0.2625
Add Distilled Water to the Specimen				
3/30/2022	10:00	1.0	1430	0.3712
3/30/2022	11:00	1.0	1490	0.3712

Expansion Index (EI meas) =	108.7
Expansion Index (Report) =	**109**

Expansion Index, EI_{50}	CBC CLASSIFICATION *	UBC CLASSIFICATION **
0-20	Non-Expansive	Very Low
21-50	Expansive	Low
51-90	Expansive	Medium
91-130	Expansive	High
>130	Expansive	Very High

* Reference: 2019 California Building Code, Section 1803.5.3

** Reference: 1997 Uniform Building Code, Table 18-I-B.

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EXPANSION INDEX TEST RESULTS

ASTM D-4829

Checked by: JS

Project No.: W1035-88-01

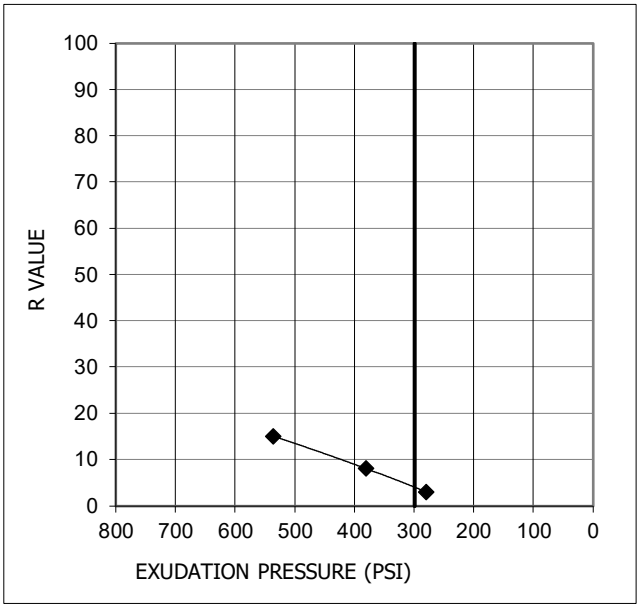
Oak Creek Community Park
15616 Oak Valley Drive
Irvine, California

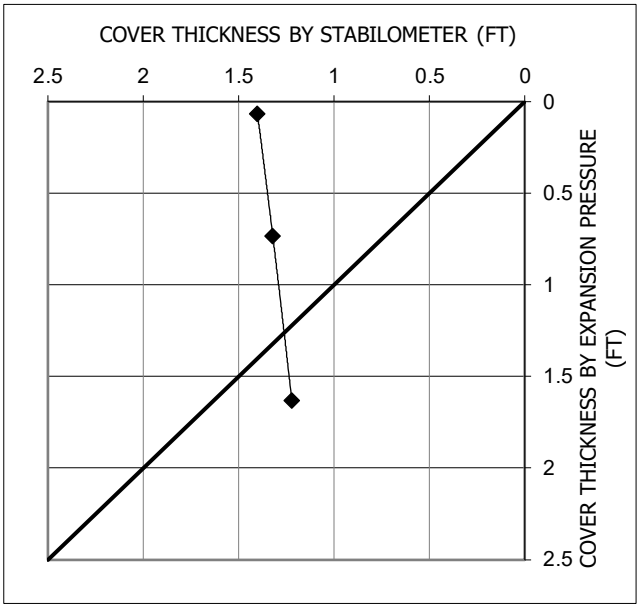
April 2022 Figure B9

Mold ID		A	B	C
Exudation Pressure	(psi)	536	380	280
Expansion Dial	(.0001")	49	22	2
Expansion Pressure	(psf)	212.2	95.3	8.7
Resistance 'R' Value	(psi)	15	8	3
Moisture Content	(%)	21.1	23.2	26.4
Dry Density	(pcf)	106	103.4	98.0

Sample ID:
B4+B5@0-3'
Sample Description:
Clay with Sand (CL), dark brown

R-Value by Expansion:	12
R-Value by Exudation:	4
R-Value by Equilibrium:	**4**





GEOCON

R-VALUE TEST RESULTS

ASTM D-2844

Checked by: JS

Project No.: W1035-88-01

Oak Creek Community Park
15616 Oak Valley Drive
Irvine, California

April 2022 Figure B10

SUMMARY OF LABORATORY WATER SOLUBLE SULFATE TEST RESULTS
CALIFORNIA TEST NO. 417

Sample No.	Water Soluble Sulfate (% SO_4)	Sulfate Exposure*
B1@0-3'	0.247	S2

GEOCON

CORROSIVITY TEST RESULTS

Checked by: JS

Project No.: W1035-88-01

Oak Creek Community Park
15616 Oak Valley Drive
Irvine, California

April 2022 Figure B11

Appendix D Soil Sampling

Appendix

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TECHNICAL MEMORANDUM

DATE	May 4, 2022
TO	City of Irvine
ADDRESS	One Civic Center Plaza Irvine, California 92623
CONTACT	Kathleen Haton, Senior Planner
FROM	Denise Clendening, Ph.D.
SUBJECT	Oak Creek Community Park Expansion Soil Sampling
PROJECT NUMBER	COI-56.0

BACKGROUND

This limited soil sampling report is prepared for the City of Irvine Community Services Department as part of the effort to expand the existing facilities at the Oak Creek Community Park in Oakcreek Village (Planning Area 12) at 15616 Valley Oak Drive in the City of Irvine, California (Figure 1). The project site is bounded by Sand Canyon Avenue to the southeast, Valley Oak Drive to the northwest, Barranca Parkway to the southwest, and corporate offices to the northeast. The existing park facilities that include a baseball field, two soccer fields, a children's playground area, a flat grassy play area, a restroom building, a picnic shelter, BBQ grills, picnic tables and a paved parking lot are all located at the northerly portion of the site. The southerly portion of the site is owned by Southern California Edison (SCE) for a utility easement and is currently undeveloped. The proposed expansion of park facilities would include improvements within SCE's property. Figure 2, *Aerial Photograph* shows the park site and the SCE easement area.

The purpose of this investigation was to evaluate the surface soils in the expansion area for residual organochlorine pesticides due to historical agricultural use including an orchard followed by row crops from approximately 1938 to about 1990. The plans for the 8-acre SCE expansion parcel include a new unlighted flex field, a general park parking area, and a dog park parking area

Site Description

The 8-acre project site is currently an SCE easement that is roughly level bare soil with overhead powerline structures with the Oak Creek Community Park bordering the SCE parcel on the north northeast. There is a northwest to southeast rending berm that separates the SCE easement from the existing Oak Creek Community Park. The SCE Santiago Substation is located to the east across Sand Canyon Avenue.

The project site and its immediate vicinity are within the Oak Creek Planning Area (PA12), which is generally bounded by the I-5 freeway to the north, Sand Canyon Avenue to the east, agriculture uses and the San Diego Freeway (I-405) to the south, and Jeffrey Road to the west. The zoning designation of the project site is 1.5

Recreation. This zoning district identifies lands suitable for active recreational opportunities and activities for public use and enjoyment. The General Plan land use designation of the site is Recreation. This designation contains uses primarily for active public recreational activities that are enjoyed by the immediate and surrounding communities. City-owned parks, regional parks, golf courses, and other similar uses are allowed in this category.

SITE HISTORY

Historically, the project site was developed for agricultural purposes, orchards from at least 1938 to 1967, followed by intermittent row crops from the 1970s to about 2002. No structures were identified as being on the easement and overhead powerline have been present since the early 1970s when the substation is first seen to the east pf the site. No Phase I Environmental Site Assessment or other environmental summary reports of historic land uses were available for review.

Objective of the Soil Sampling

The overall objective of the soil sampling is to evaluate if there are residual concentrations of organochlorine pesticides and arsenic in soil at the site from historic agricultural land use that could be of a concern for the planned future land uses.

Field Sampling

Soil samples were collected from four locations within the project area from two sample depths; 0 to 0.5 feet below ground surface (bgs) and from 2 to 2.5 feet bgs. Soil samples were collected using a hand auger on the site on March 10, 2022. Two sample locations were placed within the planned turf field, one sample location in the parking lot and one sample location in the dog park parking location. Select soil samples were analyzed by an analytical laboratory accredited by the California Department of Public Health (CDPH) Environmental Laboratory Accreditation Program (ELAP) for organochlorine pesticides (OCPs) by EPA Method 8081A and arsenic by EPA Method 6010B. All surface samples were analyzed for arsenic and the four surface samples were composited for one composite sample and the four deeper soil samples were composited for OCP analysis. Department of Toxic Substances Control (DTSC) agricultural guidance assumes a relatively even distribution of chemicals across an agricultural field, compositing of discrete samples allows for increased sampling coverage for a site[1]. DTSC guidance indicates that composite samples may be made up of a maximum of four discrete surface samples from adjacent sampling locations.

All equipment that came into contact with the soil was decontaminated consistently to assure the quality of samples collected. Decontamination was conducted prior to and after each use of a piece of equipment. All sampling devices used were decontaminated using the following procedures:

- Non-phosphate detergent and distilled water wash, using a brush.
- Initial deionized/distilled water rinse; and
- Final deionized/distilled water rinse.

[1] Department of Toxic Substances Control 2008. Interim Guidance for Sampling Agricultural Properties (Third Revision) August 7.

Soil cuttings were immediately backfilled into the original boring and decontamination water was disposed of in accordance with the Office of Emergency and Remedial Response (OERR) Directive 9345.3-02 (1991). Used personal protection equipment (PPE) were double bagged and placed in a municipal refuse dumpster.

Results

Organochlorine pesticide concentrations and arsenic from soil are summarized in the tables below. All laboratory results are included as an attachment.

Pesticides

The surface and deeper composite samples were collected from across the site to assess for potential residual pesticides from historic agricultural usage of the site. One OCP, dieldrin was detected In the surface composite at a concentration of 0.17 milligrams per kilogram (mg/kg) and was not detected in the deeper composite sample The concentration of dieldrin was compared to the Department of Toxic Substances Control (DTSC) modified screening levels (SLs) for commercial land use which assumes that an individual will be at the site for 25 years, 250 days per year for 8 hours per day which is health protective for recreational land use.[2]

Table 1 OCP Concentrations

Sample ID	Dieldrin (mg/kg)	SL Commercial Exposure	Ratio Con to SL
Composite B-1, B-2, B-3, B-4@0.5'	0.17	0.093	1.8
Composite B-1, B-2, B-3, B-4@2.5'	<0.005	0.093	

Since agricultural properties are assumed to have uniform application of pesticides, DTSC has allowed compositing of samples for OCP analyses. The concentration from the composited sample can be used directly in the screening level risk assessment without adjusting the screening level (DTSC 2008). The composite sample slightly exceeds the screening level resulting in an estimated risk of 1.8 x 10-6 which is within the EPA's risk management range of 1x10-4 to 1x10-6. Because the site will be paved with either asphalt parking surfaces or a turf field, direct exposure to the soil is not expected to occur and the estimated risk is low indicating OCPs are not a concern for the site.

Arsenic

Arsenic was analyzed for discretely in four surface soil samples by EPA Method 6010B. Arsenic may be elevated at sites due to agricultural usage. Sample results show that arsenic was not elevated and was nondetect in all samples analyzed.

Table 2 Arsenic Concentrations

Sample ID	Arsenic Concentration mg/kg
B-1@0.5'	<1.0
B-2@0.5'	<1.0
B-3@0.5'	<1.0
B-4@0.5'	<1.0

[2] DTSC 2020. Human Health Risk Assessment (HHRA) Note Number 3, DTSC-modified Screening Levels (DTSC-SLs) June 2020.

The DTSC's screening level for arsenic in southern California soils is 12 mg/kg and arsenic was not detected above the 1.0 mg/kg detection limit indicating that arsenic is not an issue for the site.

Conclusion

Based on the field sampling and analysis at the project site, the analytical results show that historic agricultural usage of the site is not a concern based on planned future land use. There have been no releases at the site of concern.

Based on our understanding of the site PlaceWorks concludes that further assessment of the site is not necessary. The site has found to be not significantly impacted and risks to human health and the environment are found to be within acceptable levels based on the conservative screening-level risk screening.

If you have any questions please do not hesitate to contact the undersigned.

Sincerely,

PLACEWORKS

Denise Clendening, Ph.D.
Associate Principal

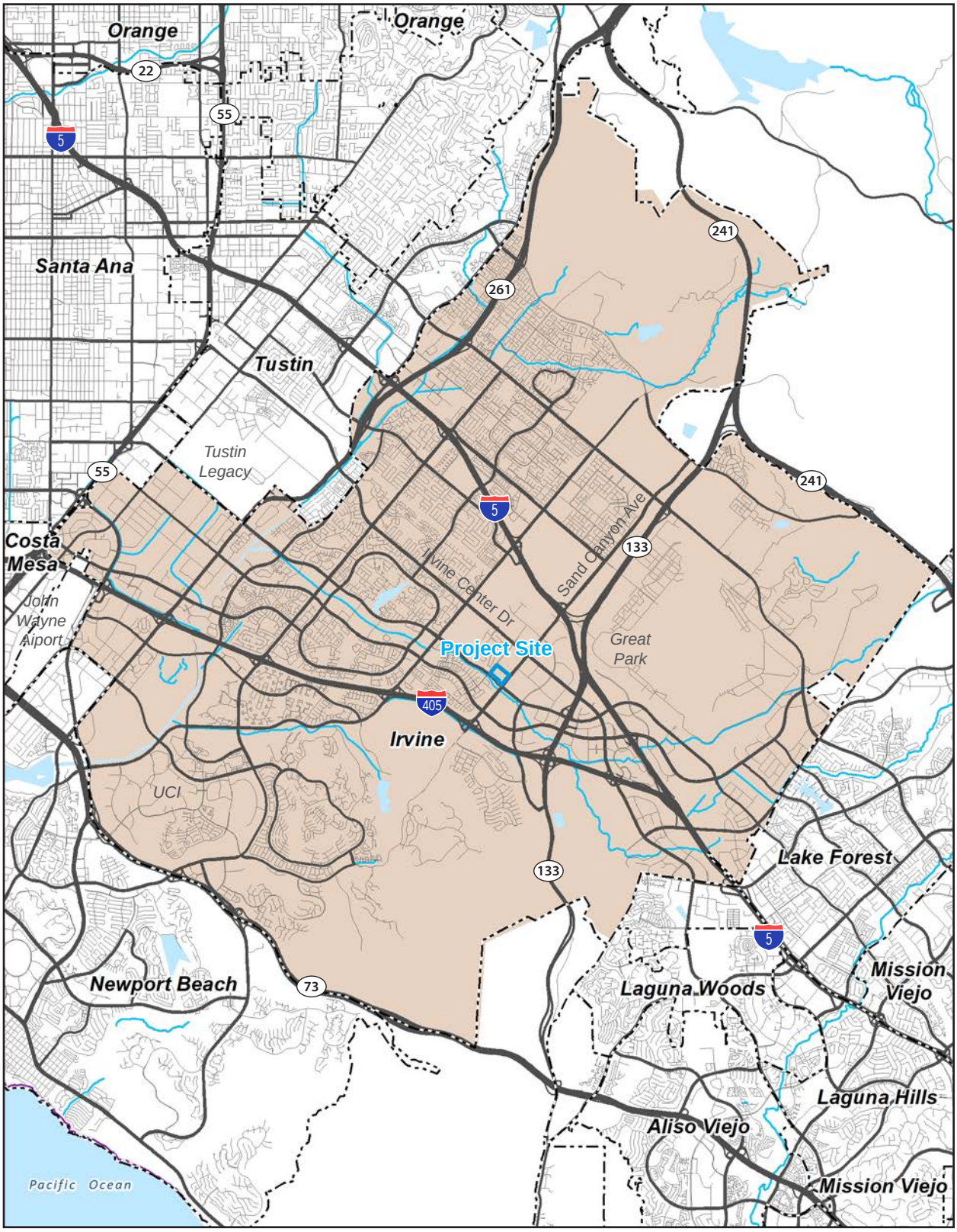
Michael Watson, PG 8177
Senior Geologist

Enclosures

Attachments:

Figure 1 – Local Vicinity
Figure 2 – Aerial Photograph
Figure 3 – Sample Locations
Laboratory Data

Figure 1 - Local Vicinity



Project Boundary

City Boundary

0 1
Scale (Mile)

Source: ESRI, 2021

PlaceWorks

Figure 2 - Aerial Photograph



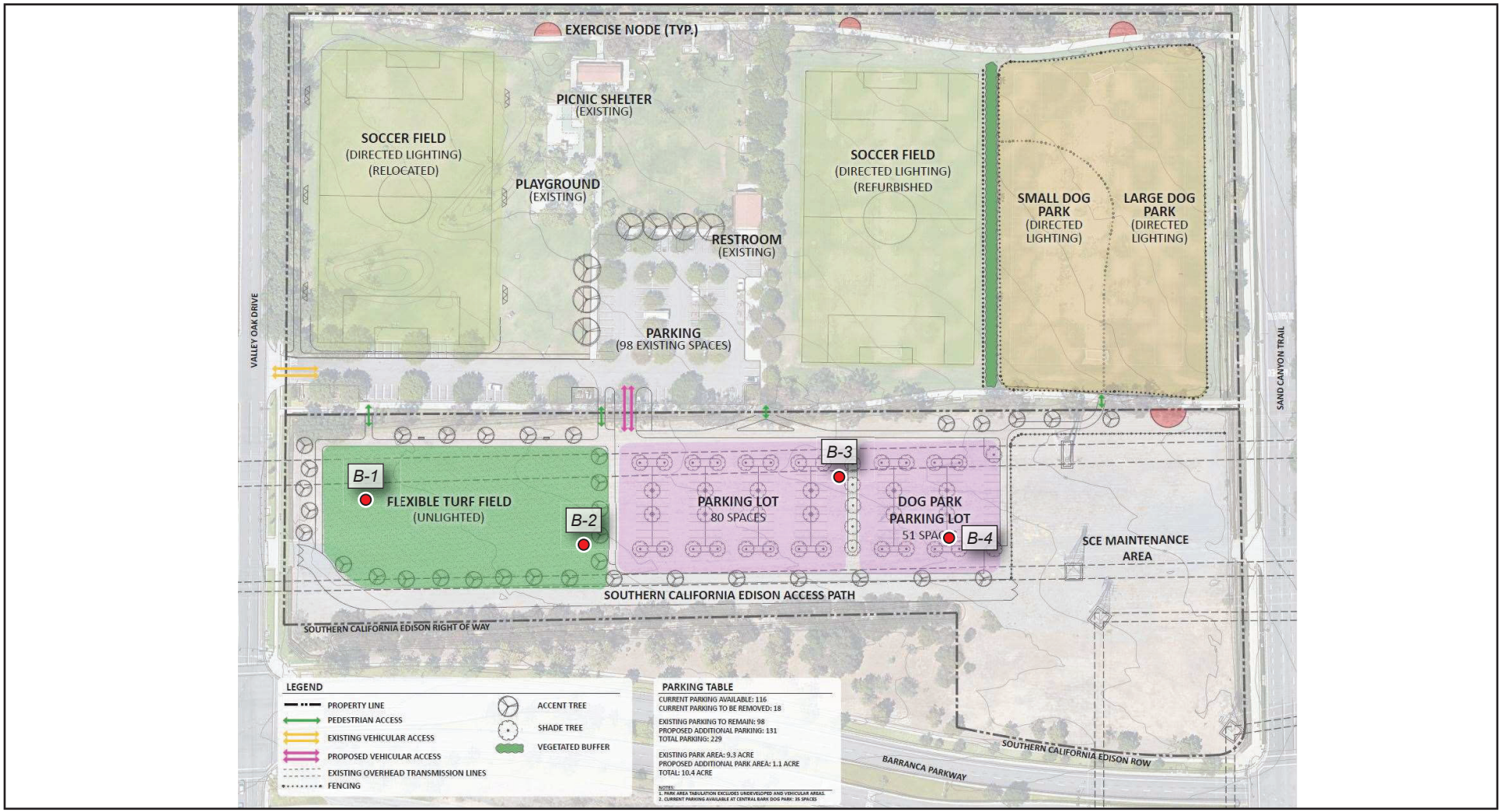
Project Boundary

0 450
Scale (Feet)

Source: Nearmap, 2021

PlaceWorks

Figure 3 - Soil Sample Locations



B-X Soil Sample Locations (4)

0 165
Scale (Feet)

Source: Schmidt Design Group, 2021

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CASE NARRATIVE

Authorized Signature Name / Title (print)	Ken Zheng, President
Signature / Date	Ken Zheng, President 03/18/2022 15:10:54
Laboratory Job No. (Certificate of Analysis No.)	2203-00100
Project Name / No.	OAK CREEK COMMUNITY PARK, IRVINE, CA / COI-56
Dates Sampled (from/to)	03/10/22 To 03/10/22
Dates Received (from/to)	03/10/22 To 03/10/22
Dates Reported (from/to)	03/18/22 To 3/18/2022
Chains of Custody Received	Yes

Comments:

Subcontracting

Organic Analyses

No analyses sub-contracted

Inorganic Analyses

No analyses sub-contracted

Sample Condition(s)

All samples intact

Positive Results (Organic Compounds)

Sample	Analyte	Result	Qual	Units	RL	Result	Qual	Units	RL
COMPOSITE: B-1, B-2, B-3, B-4@	Dieldrin	**0.017**		mg/Kg	0.0050				

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CERTIFICATE OF ANALYSIS

2203-00100

PLACEWORKS
DENISE CLENDENING
2850 INLAND EMPIRE BLVD.
SUITE B
ONTARIO, CA 91764

Date Reported	03/18/22
Date Received	03/10/22
Invoice No.	94412
Cust #	P135
Permit Number	
Customer P.O.	

Project: OAK CREEK COMMUNITY PARK, IRVINE, CA / COI-56

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 001 **B-1@0.5'**					Date & Time Sampled:		03/10/22 @	7:07
Sample Matrix: **Soil**								
[Metals]								
Metals Acid Digestion	Complete			EPA 3050B	1.0		03/14/22	TLB
Arsenic	<1.0		mg/Kg	EPA 6010B	1.0	1.0	03/14/22	TLB
Sample: 002 **B-2@0.5'**					Date & Time Sampled:		03/10/22 @	7:38
Sample Matrix: **Soil**								
[Metals]								
Metals Acid Digestion	Complete			EPA 3050B	1.0		03/14/22	TLB
Arsenic	<1.0		mg/Kg	EPA 6010B	1.0	1.0	03/14/22	TLB
Sample: 003 **B-3@0.5'**					Date & Time Sampled:		03/10/22 @	8:03
Sample Matrix: **Soil**								
[Metals]								
Metals Acid Digestion	Complete			EPA 3050B	1.0		03/14/22	TLB
Arsenic	<1.0		mg/Kg	EPA 6010B	1.0	1.0	03/14/22	TLB
Sample: 004 **B-4@0.5'**					Date & Time Sampled:		03/10/22 @	8:35
Sample Matrix: **Soil**								
[Metals]								
Metals Acid Digestion	Complete			EPA 3050B	1.0		03/14/22	TLB
Arsenic	<1.0		mg/Kg	EPA 6010B	1.0	1.0	03/14/22	TLB
Sample: 005 **COMPOSITE: B-1, B-2, B-3, B-4@0.5'**					Date & Time Sampled:		03/10/22 @	7:07
Sample Matrix: **Soil**								
[Pesticides]								
Ultrasonic Extraction	Complete			EPA 3550	1.0		03/17/22	JEN
Aldrin	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
alpha-BHC	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
beta-BHC	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
delta-BHC	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
gamma-BHC	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Chlordane	<0.010		mg/Kg	EPA 8081A	1.0	0.010	03/17/22	JEN
4,4'-DDD	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN

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CERTIFICATE OF ANALYSIS

2203-00100

PLACEWORKS
DENISE CLENDENING
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SUITE B
ONTARIO, CA 91764

Date Reported 03/18/22
Date Received 03/10/22
Invoice No. 94412
Cust # P135
Permit Number
Customer P.O.

Project: OAK CREEK COMMUNITY PARK, IRVINE, CA / COI-56

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 005 **COMPOSITE: B-1, B-2, B-3, B-4@0.5'**					Date & Time Sampled:		03/10/22 @	7:07
Sample Matrix: **Soil**								
.....continued								
4,4'-DDE	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
4,4'-DDT	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Dieldrin	**0.017**		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Endosulfan I	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Endosulfan II	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Endosulfan Sulfate	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Endrin	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Endrin Aldehyde	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Endrin ketone	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Heptachlor	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Heptachlor Epoxide	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Methoxychlor	<0.010		mg/Kg	EPA 8081A	1.0	0.010	03/17/22	JEN
Toxaphene	<0.050		mg/Kg	EPA 8081A	1.0	0.050	03/17/22	JEN
[Surrogates]								
Tetrachloro-m-xylene	140		%REC	EPA 8081A/8082		50-150	03/17/22	JEN
Decachlorobiphenyl	150		%REC	EPA 8081A/8082		50-150	03/17/22	JEN
Sample: 006 **COMPOSITE: B-1, B-2, B-3, B-4@2.5'**					Date & Time Sampled:		03/10/22 @	7:07
Sample Matrix: **Soil**								
[Pesticides]								
Ultrasonic Extraction	Complete			EPA 3550	1.0		03/17/22	JEN
Aldrin	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
alpha-BHC	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
beta-BHC	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
delta-BHC	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
gamma-BHC	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Chlordane	<0.010		mg/Kg	EPA 8081A	1.0	0.010	03/17/22	JEN
4,4'-DDD	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
4,4'-DDE	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
4,4'-DDT	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Dieldrin	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN

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CERTIFICATE OF ANALYSIS

2203-00100

PLACEWORKS
DENISE CLENDENING
2850 INLAND EMPIRE BLVD.
SUITE B
ONTARIO, CA 91764

Date Reported	03/18/22
Date Received	03/10/22
Invoice No.	94412
Cust #	P135
Permit Number	
Customer P.O.	

Project: OAK CREEK COMMUNITY PARK, IRVINE, CA / COI-56

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 006 **COMPOSITE: B-1, B-2, B-3, B-4@2.5'**					Date & Time Sampled:		03/10/22 @	7:07
Sample Matrix: **Soil**								
.....continued								
Endosulfan I	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Endosulfan II	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Endosulfan Sulfate	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Endrin	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Endrin Aldehyde	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Endrin ketone	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Heptachlor	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Heptachlor Epoxide	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	03/17/22	JEN
Methoxychlor	<0.010		mg/Kg	EPA 8081A	1.0	0.010	03/17/22	JEN
Toxaphene	<0.050		mg/Kg	EPA 8081A	1.0	0.050	03/17/22	JEN
[Surrogates]								
Tetrachloro-m-xylene	150		%REC	EPA 8081A/8082		50-150	03/17/22	JEN
Decachlorobiphenyl	150		%REC	EPA 8081A/8082		50-150	03/17/22	JEN

Respectfully Submitted: Ken Zheng

Ken Zheng - Lab Director

QUALIFIERS

B = Detected in the associated Method Blank at a concentration above the routine RL.
B1 = BOD dilution water is over specifications . The reported result may be biased high.
D = Surrogate recoveries are not calculated due to sample dilution.
E = Estimated value; Value exceeds calibration level of instrument.
H = Analyte was prepared and/or analyzed outside of the analytical method holding time
I = Matrix Interference.
J = Analyte concentration detected between RL and MDL.
Q = One or more quality control criteria did not meet specifications. See Comments for further explanation.
S = Customer provided specification limit exceeded.

ABBREVIATIONS

DF = Dilution Factor
RL = Reporting Limit, Adjusted by DF
MDL = Method Detection Limit, Adjusted by DF
Qual = Qualifier
Tech = Technician

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QUALITY CONTROL DATA REPORT

PLACEWORKS
ONTARIO, CA 91764

2203-00100

Date Reported	**03/18/2022**
Date Received	**03/10/2022**
Date Sampled	**03/10/2022**
Invoice No.	**94412**
Customer #	**P135**
Customer P.O.	

Project: OAK CREEK COMMUNITY PARK, IRVINE, CA / COI-56

Method # EPA 6010B
QC Reference # 101559 **Date Analyzed:** 3/14/2022 **Technician:** TLB
Samples 001 002 003 004

Results

	LCS %REC	LCS %DUP	LCS %RPD	SPIKE %REC	SPIKE %DUP	SPIKE %RPD
Arsenic	102	100	1.8	79	80	0.5

Control Ranges

LCS %REC	LCS %RPD	SPIKE %RPD
75 - 125	0 - 20	0 - 20

Method # EPA 8081A
QC Reference # 101684 **Date Analyzed:** 3/17/2022 **Technician:** JEN
Samples 005 006

Results

	LCS %REC
4,4'-DDT	110
Aldrin	110
Dieldrin	120
Endrin	120
gamma-BHC	110
Heptachlor	120

Control Ranges

LCS %REC
30 - 130
50 - 140
70 - 130
70 - 150
50 - 150
50 - 150

Method # EPA 8081A/8082
QC Reference # 101684 **Date Analyzed:** 3/17/2022 **Technician:** JEN
Samples 005 006

No QC recoveries reported.

No method blank results were above reporting limit

Respectfully Submitted: Ken Zheng

Ken Zheng - President

ARL

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1650 S. Grove Ave., Ste C, Ontario, CA 91761
Tel: 951-779-0310 / 909-781-6335 Fax: 951-779-0344
E-mail: office@arlaboratories.com

CHAIN OF CUSTODY

A & R Work Order #: 2203-100

Page 1 of 1

Client Name: PLACEWORKS
E-mail: DCLENDENING@PLACEWORKS.COM
Address: 2850 INLAND EMPIRE BLVD ONTARIO CA 91764
Report Attention: Denise Phone #: 909 989 4449 Fax: # Sampled By: M. Watson
Project No./ Name: COI-56
Project Site: OAK CREEK COMMUNITY PARK IRVINE, CA

☒ Chilled ☒ Intact ☐ Seal

Turn Around Time Requested
☐ Rush 8 12 24 48 Hours
☒ Normal

Analyses Requested

Lab # (Lab use)	Client Sample ID	Sample Collection Date	Sample Collection Time	Matrix Type	Sample Preserve	No., type* & size of container	EPA8260B (VOCs & Oxygenates)	EPA8260B(BTEX & Oxygenates)	LUFT / 8015 (Gasoline)	LUFT / 8015 (Diesel)	EPA8081A (Organochlorine Pesticides)	EPA 8082 (PCBs)	EPA 8015M (Carbon Chain C4-C40)	EPA 6010B/7000 (CAM 17 Metals)	Micro: Plate Cnt., Coliform, E-Coli	6010B Arsenic						Remarks (C=composite, X=discrete)
1	B-1@0.5'	3/10/22	0707	Soil	ice	1 glass jar					C					X				(5)		B-1, B-2, B-3, B-4 @ 0.5'
	B-1@2.5'		0715								C									(6)		B-1, B-2, B-3, B-4 @ 2.5'
2	B-2@0.5'		0738								C					X						See B-1@0.5'
	B-2@2.5'		0747								C											See B-1@2.5'
3	B-3@0.5'		0803								C					X						See B-1@0.5'
	B-3@2.5'		0814								C											See B-1@2.5'
4	B-4@0.5'		0835								C					X						See B-1@0.5'
	B-4@2.5'		0847								C											See B-1@2.5'

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
[signature]	PLACEWORKS	3/10/22	1045	[signature]	A&R	3/10/22	1045
Relinquished By	Company	Date	Time	Received By	Company	Date	Time

Note: Samples are discarded 30 days after results are reported unless other arrangements are made.

Matrix Code: DW=Drinking Water; GW=Ground Water; WW=Waste Water; SD=Solid Waste; SL=Sludge; SS=Soil/Sediment; AR=Air; PP=Pure Product

Preservative Code: IC=Ice; HC=HCl; HN=HNO_3; SH=NaOH; ST=$Na_2S_2O_3$; HS=H_2SO_4

* Sample Container Types: T=Tedlar Air Bag; G=Glass Container; ST= Steel Tube; B= Brass Tube; P=Plastic Bottle; V=VOA Vial; E= EnCore

Sample Acceptance Checklist

CLIENT: PLACEWORKS WORK ORDER NUMBER: 2203.100

Temperature:(Criteria:0.0°C-6.0°C)

Sample Temp.(w/CF) °C(w/CF) 4.0°c

☐ Sample(s) outside temprature criteria: PM contacted by :

☐ Sample(s) outside temprature criteria, but received on ice/chilled on same day of sampling.

☐ Sample(s) received at ambient temprature; placed on ice for transport by courier.

Ambient Temprature ☐ Air ☐ Filter

CUSTODY SEAL:

Cooler ☐ Present and Intact ☐ Present and Not Intact ✓ Not Present

Sample(s) ☐ Present and Intact ☐ Present and Not Intact ✓ Not Present

Sample Condition:	Yes	No	N/A
Was a COC received	✓		
Were sample IDs present?	✓		
Were sampling dates & times present?	✓		
Was a relingquished signature present?	✓		
Were the tests required clearly indicated?	✓		
Were all samples sealed in plastic bags?		✓	
Did all bottle labels agree with COC? (ID, dates and times)	✓		
Were correct containers used for the tests required?	✓		
Was a sufficient amount of samples sent for tests indicated?	✓		
Was there headspace in VOA vials?			✓
Were the containers labeled with correct preservatives?			✓

Explanations/Comments:

Notification:

For discrepancies, how was the Project Manager notified? Verbal

Verbal: PM Initials: _____ Data/Time: _____

Email: Send to: _____ Data/Time: _____

Project Manager's response:

Completed By: _____ Date: 3.10.22

A R Laboratories
1650 S. Grove Ave., Suite C, Ontario, CA 91761
PH: 951-779-0310 Fax: 951-779-0344
Email: office@arlaboratories.com

Appendix E Preliminary WQMP

Appendix

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Preliminary Water Quality Management Plan (PWQMP)

Project Name:

Oak Creek Community Park

Prepared for:

City of Irvine

Community Services Department

One Civic Center Plaza

Irvine, CA 92623

Prepared by:

Adams Streeter Civil Engineers

Engineer: Mo Abadi Registration No. 42615

16755 Von Karman Ave. Suite 150

Irvine CA, 92606

949.474.2330

Prepared on:

April 8, 2022

Template Prepared:

July 15, 2011



Project Owner's Certification

Permit/Application No.		Grading Permit No.	
Tract/Parcel Map No.		Building Permit No.	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract)			APN 466-022-26

This Water Quality Management Plan (WQMP) has been prepared for City of Irvine by Adams Streeter Civil Engineers. The WQMP is intended to comply with the requirements of the local NPDES Stormwater Program requiring the preparation of the plan.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the current Orange County Drainage Area Management Plan (DAMP) and the intent of the non-point source NPDES Permit for Waste Discharge Requirements for the County of Orange, Orange County Flood Control District and the incorporated Cities of Orange County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement and amend the WQMP. An appropriate number of approved and signed copies of this document shall be available on the subject site in perpetuity.

Owner:			
Title			
Company			
Address			
Email			
Telephone #			
Signature		Date	

Contents

Page No.

Section I Discretionary Permit(s) and Water Quality Conditions.....3
Section II Project Description.....4
Section III Site Description 10
Section IV Best Management Practices (BMPs).....12
Section V Inspection/Maintenance Responsibility for BMPs.....24
Section VI Site Plan and Drainage Plan 26
Section VII Educational Materials.....27

Attachments

Attachment A . .....Educational Materials
Attachment B . .....BMP Calculations
Attachment C . .....BMP Site Plan
Attachment D . ..... Hydromodification Calculations
Attachment E . ..... Orange County Rainfall Zones Map

Section I Discretionary Permit(s) and Water Quality Conditions

Project Infomation			
Permit/Application No.		Tract/Parcel Map No.	
Additional Information/ Comments:			
Water Quality Conditions			
Water Quality Conditions (list verbatim)	N/A		
Watershed-Based Plan Conditions			
Provide applicable conditions from watershed - based plans including WIHMPs and TMDLS.	N/A		

Section II Project Description

II.1 Project Description

Description of Proposed Project				
Development Category (Verbatim from WQMP):	New development projects that create 10,000 square feet or more of impervious surface. This category includes commercial, industrial, residential housing subdivisions, mixed-use, and public projects on private or public property that falls under the planning and building authority or the Permittees. Parking lots 5,000 square feet or more including associated drive aisle, and potentially exposed to urban stormwater runoff. A parking lot is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce.			
Project Area (ft^2): ____831,996___	Number of Dwelling Units ___N/A___		SIC Code: _____N/A_____	
Narrative Project Description:	The Oak Creek Community Park renovation project will consist of converting an existing baseball field to a new synthetic turf soccer field, the refurbishment of an existing soccer field, the addition of two new dog parks and the construction of a new 141 stall asphalt parking lot. In addition, new concrete and decomposed granite walkways are intended to provide access to the new amenities.			
Project Area	Pervious		Impervious	
	Area (acres)	Percentage	Area (acres)	Percentage
Pre-Project Conditions	17.10	89	2.00	11
Post-Project Conditions	15.13	79	3.97	21
Drainage Patterns/Connections	The drainage for the existing site is achieved via surface flows draining from northeast towards the southwest direction to be picked-up in an existing storm drain facility located in Valley Oak Drive. The existing site drains southwest at two locations with connections to an existing 78-inch RCP located in Valley Oak Drive, a 36" RCP pipe drains the existing community park and an 18" RCP pipe drains the existing SCE property. The existing storm drain pipe is located along the south side			

	of the community park. Currently, the site is bermed along the perimeter with drainage surface-flowing towards the parkway. The proposed drainage condition includes provisions to capture and treat runoff from the new parking lot that will be constructed on the SCE site. Storm drain improvements consisting of a trench drain and 18″ RCP pipe conveys drainage from the proposed parking lot to a water quality unit. Treated and overflow runoff from the water quality unit drains towards the westerly corner of the site and is captured by the existing 24″ CSP riser that conveys runoff to Valley Oak Drive. The existing turf / green areas located on-site will largely remain as turf or synthetic turf. Existing drainage patterns will be held for the proposed improvements as the site is already tabled to drain toward the Existing 78-inch RCP located on Valley Oak Drive.

II.2 Potential Stormwater Pollutants

Pollutants of Concern			
Pollutant	Circle One: E=Expected to be of concern N=Not Expected to be of concern		Additional Information and Comments
Suspended-Solid/ Sediment	(E)	N	
Nutrients	(E)	N	
Heavy Metals	(E)	N	
Pathogens (Bacteria/Virus)	(E)	N	
Pesticides	(E)	N	
Oil and Grease	(E)	N	
Toxic Organic Compounds	(E)	N	
Trash and Debris	(E)	N	

II.3 Hydrologic Conditions of Concern

☐ No – Show map

☒ Yes – Describe applicable hydrologic conditions of concern below. *Refer to Section 2.2.3 in the TGD.*

The project drains to Newport Bay that is potentially susceptible to hydromodification impacts. However, the proposed project is projected to mitigate any hydrologic conditions of concern and is not expected to cause an adverse impact on downstream receiving waters. The total increase in storm water runoff for the 2yr-24hr storm event is 3.15%.

2 year existing storm flow rate: 17.47 cfs

2 year proposed storm flow rate: 18.02 cfs

Please see hydrologic calculations located in Attachment D for further details

II.4 Post Development Drainage Characteristics

Generally, the runoff from the new parking area will sheet flow to the southwest into a concrete curb and gutters. Drainage from the gutters will be diverted into a proposed Modular Wetlands Biofiltration System. A small portion of runoff will be diverted to the north where a trench drain spanning the width of the parking lot entrance will intercept the runoff and redirect the runoff to the MWS unit.

The MWS will be located in a landscape buffer on the southwest corner of the parking lot. Qdesign flows will be treated by the MWS unit and the remaining bypass flows drain towards the westerly corner of the site and are captured by the existing 24" CSP riser that conveys runoff to Valley Oak Drive.

Once the Qdesign flow cycles through the MWS unit, the treated runoff will be diverted back into the existing SD system terminating into the San Diego Creek and then into the Newport Bay.

In addition to the parking lot improvements, concrete walkways are proposed along the east perimeter of the new soccer field, south and west perimeter of the proposed dog parks as well as along the south side of the existing parking lot. The walkways are 5' wide paths designed to provide access to the new amenities and have landscaping on both sides. The minimal runoff generated from the walkways will discharge onto the adjacent landscaping where it will be absorbed by the soil.

II.5 Property Ownership/Management

The property will be owned and operated by The City of Irvine.

Section III Site Description

III.1 Physical Setting

Planning Area/ Community Name	Planning Area 12 – Oakcreek
Location/Address	15616 Valley Oak Drive, Irvine CA, 92606
Land Use	Recreation
Zoning	1.5
Acreage	19.10
Predominant Soil Type	Soil type B Per Figure XVI-2a of the North County TGD.

III.2 Site Characteristics

Precipitation Zone	*Design capture storm depth = 0.75 inches*
Topography	*The project has no large variations in grade and generally slopes to the southwest.*
Drainage Patterns/Connections	*See section II.2 for details*
Soil Type, Geology, and Infiltration Properties	*Soil Type B Per Figure XVI-2a of the North County TGD.*

Site Characteristics (continued)	
Hydrogeologic (Groundwater) Conditions	
Geotechnical Conditions (relevant to infiltration)	*The percolation rate on this site is infeasible for infiltration*
Off-Site Drainage	*No offsite drainage will be directed onto the site*
Utility and Infrastructure Information	*The project site discharges into an existing 78" RCP located in Valley Oak Drive.*

III.3 Watershed Description

Receiving Waters	San Diego Creek Reach 1, Upper Newport Bay, and Lower Newport Bay
303(d) Listed Impairments	San Diego Creek Reach 1 –Fecal Cloriform, Nutrients, Pesticides, Sedimentation/Siltation, Selenium, Toxaphene Newport Bay (Upper) Chlordane, Copper, DDT, indicator Bacteria, metals, nutrients, PCBs, sediment toxicity, Sedimentation/Siltation Newport Bay (Lower) Chlordane, Copper, DDT, indicator Bacteria, nutrients, PCBs, pesticides, sediment toxicity
Applicable TMDLs	San Diego Creek Reach 1 –Metals, Nutrients, Pesticides, Siltation Newport Bay (Upper) Metals, Nutrients, Pathogens, Pesticides, Siltation Newport Bay (Lower) Metals, Nutrients, Pathogens, Pesticides, Priority Organics, Siltation
Pollutants of Concern for the Project	The pollutants of concern for this project are Suspended Solids/Sediments, Nutrients, Heavy Metals, Pathogens, Pesticides, Toxic Organic Compounds, and Trash.

Environmentally Sensitive and Special Biological Significant Areas	N/A

Section IV Best Management Practices (BMPs)

IV. 1 Project Performance Criteria

(NOC Permit Area only) Is there an approved WIHMP or equivalent for the project area that includes more stringent LID feasibility criteria or if there are opportunities identified for implementing LID on regional or sub-regional basis?		YES ☐	NO ☒
If yes, describe WIHMP feasibility criteria or regional/sub-regional LID opportunities.			

Project Performance Criteria (continued)	
If HCOC exists, list applicable hydromodification control performance criteria (Section 7.II-2.4.2.2 in MWQMP)	N/A
List applicable LID performance criteria (Section 7.II-2.4.3 from MWQMP)	The project will be designed to treat the 85th percentile, 24-hour storm event (Design Flow) of 0.31 cfs.
List applicable treatment control BMP performance criteria (Section 7.II-3.2.2 from MWQMP)	Modular Wetlands Systems: The treatment capacity (cfs) for the single MWS unit that will treat the flow from drainage A is 0.34 CFS
Calculate LID design storm capture volume for Project.	Capture Volume: 1,163.87 cf (Worksheet B) Treatment Capacity= 0.34 cfs > Design Flow = 0.31 cfs

IV.2. SITE DESIGN AND DRAINAGE PLAN

The following section describes the site design BMPs used in this project and the methods used to incorporate them. Careful consideration of site design is a critical first step in storm water pollution prevention from new developments and redevelopments.

SITE DESIGN BMPs

Minimize Impervious Area

Impervious surfaces have been minimized by incorporating landscaped areas throughout the site surrounding the proposed hardscape areas.

Maximize Natural Infiltration Capacity

Under the existing conditions, infiltration capacity is low due to soils. Under the proposed condition, infiltration capacity will remain limited.

Disconnect Impervious Areas

Landscaping will be provided throughout the site, adjacent to walkways to disconnect impervious areas.

Protect Existing Vegetation and Sensitive Areas, and Revegetate Disturbed Areas

Landscaping will be replaced as appropriate in disturbed areas.

Xeriscape Landscaping

Proposed Landscaping will comprise of native draught tolerant material with efficient irrigation

DRAINAGE MANAGEMENT AREAS

In accordance with the MS4 permit and the Model WQMP, the project site has been divided into 1 Drainage Management Area (DMA) to be utilized for defining drainage areas and sizing LID and other treatment control BMPs. The DMA has been delineated based on the proposed site grading patterns, drainage patterns, storm drain and catch basin locations.

The design capture volume (DCV) and treatment flow rate (QDesign) for the DMA is summarized in the table below. It have been derived utilizing the "Simple Method" in accordance with the TGD Section III.1.1. Actual BMP sizing requirements, including 80 percent capture design volumes, flow rates, depths, and other design details for the specific BMPs proposed are provided in Section IV.3.4 below. Location of DMA and associated

LID and treatment BMP are identified on the exhibits in Section VI. Additional calculations and TGD Worksheets are provided in Attachment B.

DMA/ Drainage Area ID [1]	BMP	Drainage Area (ac)	% Imp.	Design Storm Depth[2] (in)	Estimated Tc (min.)	Rainfall Intensity[3] (in/hr)	Q_{Design}[4] (cfs)
A	Modular Wetlands System	1.71	90%	0.75	10	0.22	0.31

Notes:
1. Refer to exhibits in Section VI for location each DMA.
2. Per Figure XVI-1 of the Model WQMP Technical Guidance Document
3. Per Figure III.4 of the Model WQMP Technical Guidance Document
4. Per Section III.3.3 and Worksheet D of the Model WQMP Technical Guidance Document.

V.3 LID BMP SELECTION AND PROJECT CONFORMANCE ANALYSIS

IV.3.1 Hydrologic Source Controls

Name	Included?
Localized on-lot infiltration	☐
Impervious area dispersion (e.g. roof top disconnection)	☐
Street trees (canopy interception)	☐
Residential rain barrels (not actively managed)	☐
Green roofs/Brown roofs	☐
Blue roofs	☐
Impervious area reduction (e.g. permeable pavers, site design)	☐
Other:	☐
Other:	☐

IV.3.2 Infiltration BMPs

Name	Included?
Bioretention without underdrains	☐
Rain gardens	☐
Porous landscaping	☐
Infiltration planters	☐
Retention swales	☐
Infiltration trenches	☐
Infiltration basins	☐
Drywells	☐
Subsurface infiltration galleries	☐
French drains	☐
Permeable asphalt	☐
Permeable concrete	☐
Permeable concrete pavers	☐
Other:	☐
Other:	☐

Infiltration on the site is the most desirable BMP and must be used as much as possible however, is infeasible at this site due to existing soil conditions. In light of this, the next tier of the hierarchy was considered

IV.3.3 Evapotranspiration, Rainwater Harvesting BMPs

Name	Included?
All HSCs; *See Section IV.3.1*	☐
Surface-based infiltration BMPs	☐
Biotreatment BMPs	☐
Above-ground cisterns and basins	☐
Underground detention	☐
Other:	☐
Other:	☐
Other:	☐

Rainwater harvesting was considered for this project. This involves capturing the initial storm water runoff in a tank either above ground or below ground and later reusing it for irrigation or toilet flushing. The goal with this method is to keep the initial runoff from entering the storm drain system. The major concern with this method is the situation in which there are two successive storms in a short amount of time. The first storm would fill the tank and then before there was sufficient time to empty the tank the second storm would hit. The initial runoff from the second storm would have to bypass the tank and would end up draining untreated to the storm drain. In light of this, the next tier of biotreatment was considered.

IV.3.4 Biotreatment BMPs

Name	Included?
Bioretention with underdrains	☐
Stormwater planter boxes with underdrains	☐
Rain gardens with underdrains	☐
Constructed wetlands	☐
Vegetated swales	☐
Vegetated filter strips	☐
Proprietary vegetated biotreatment systems	☒
Wet extended detention basin	☐
Dry extended detention basins	☐
Other:	☐
Other:	☐

Since both infiltration and harvest and reuse are considered infeasible, runoff from the project site will be treated through the use of a biofiltration BMP: a proprietary biotreatment system (Modular Wetlands) with downstream of the improvements. In accordance with the Model WQMP and TGD, the biofiltration BMPs will be sized to treat runoff from the Design Capture Storm (85th percentile, 24-hour). Location and tributary drainage area is shown on the WQMP Exhibit. Detailed calculations, associated TGD Worksheets and BMP details are included in Attachment B.

Modular Wetlands by Modular Wetlands Systems, Inc. are proprietary biotreatment systems that utilize multi-stage treatment processes including screening media filtration, settling, and biofiltration. The pre-treatment chamber contains the first three stages of treatment, and includes a catch basin inlet filter to capture trash, debris, gross solids and sediments, a settling chamber for separating out larger solids, and a media filter cartridge for capturing fine TSS, metals, nutrients, and bacteria. Runoff then flows through the wetland chamber where treatment is achieved through a variety of physical, chemical, and biological processes. As storm water passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded and sequestered by the soil and plants, functioning similar to bioretention systems. The discharge chamber at the end of the unit collects treated flows and discharges back into the storm drain system.

IV.3.5 Hydromodification Control BMPs

BMP Name	BMP Description

IV.3.6 Regional/Sub-Regional LID BMPs

Regional/Sub-Regional LID BMPs
Not Applicable

IV.3.7 Treatment Control BMPs

Treatment Control BMPs	
BMP Name	**BMP Description**

IV.3.8 Non-structural Source Control BMPs

Non-Structural Source Control BMPs				
Identifier	**Name**	**Check One**		**If not applicable, state brief reason**
		Included	**Not Applicable**	
N1	Education for Property Owners, Tenants and Occupants	☒	☐	
N2	Activity Restrictions	☒	☐	
N3	Common Area Landscape Management	☒	☐	
N4	BMP Maintenance	☒	☐	
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	No hazardous material on site
N6	Local Industrial Permit Compliance	☐	☒	No local industrial permits required
N7	Spill Contingency Plan	☐	☒	There are no loading docks or vehicle maintenance areas
N8	Underground Storage Tank Compliance	☐	☒	There are no underground storage tanks on site
N9	Hazardous Materials Disclosure Compliance	☐	☒	No hazardous material on site
N10	Uniform Fire Code Implementation	☐	☒	No hazardous material on site
N11	Common Area Litter Control	☒	☐	
N12	Employee Training	☒	☐	
N13	Housekeeping of Loading Docks	☐	☒	No loading dock on site
N14	Common Area Catch Basin Inspection	☒	☐	
N15	Street Sweeping Private Streets and Parking Lots	☒	☐	
N16	Retail Gasoline Outlets	☐	☒	No gas outlet onsite.

N1. Education of Property Owners, Tenants and Occupants.

Proper education of onsite occupants will help to reduce all potential and anticipated pollutants from the site. Practical information shall be provided by the property owner to the employees on general good housekeeping BMP's and other practices that contribute to protection of storm water quality. This WQMP shall be provided with emphasis placed on the materials included in, but not limited to, Sections IV, V, VI, VII and Attachment A of this report. For additional information, see BMP SC-10, Non-Stormwater Discharges, included in Section Attachment A and the BMP Maintenance Responsibility/Frequency Matrix in Section V. Copies of The Ocean Begins at Your Front Door, Sewer Spill, Tips for Landscaping and Gardening, and Proper Maintenance Practices for Your Business are contained in Attachment A. Additional Education Materials to be used include, but are not limited to, SC-10, Non-Stormwater Discharges, SC-11, Spill Prevention, Control, and Cleanup, SC-34, Waste Handling and Disposal, and SC-41, Building & Grounds Maintenance. Also reference the Orange County Public Works website at http://www.ocwatersheds.com.

N2. Activity Restrictions.

Onsite activities shall be restricted to those currently granted by the City of Irvine and as outlined throughout this WQMP. Some general activity restrictions that shall be adhered to are:

- No discharges of fertilizer, pesticides, and wastes to streets or storm drains
- No blowing or sweeping of debris into streets or storm drains
- No hosing down of paved surfaces
- No vehicle fueling, washing, or maintenance

In addition, onsite activities shall be limited to the requirements of this WQMP as described herein. Adhering to appropriate activity restrictions will help to reduce all anticipated and potential pollutants from the site.

N3. Common Area Landscape Management.

All maintenance shall be consistent with City of Irvine guidelines. Proper landscape maintenance practices will help to reduce or eliminate pollution from pesticides, nutrients, trash/debris, and sediments. General guidelines include the following: Plant vegetation that reduces water, fertilizer, herbicide, and pesticide use. Waste shall be disposed of by composting or at a permitted landfill and shall not be raked or blown into the street, gutter, or storm drains. Irrigation systems shall be inspected monthly for poorly aligned sprinkler heads, broken sprinkler heads, and leaks. Detected problems shall be repaired as soon as they are observed. Avoid over-watering of vegetation. If excessive runoff is observed, automatic timers shall be adjusted. Note that the actual irrigation schedule and levels may vary based on soil type, maturity of vegetation, exposure, and seasonal conditions. If fertilizer is spilled on a paved surface it should be swept up immediately and placed in its container. Water shall not be used to clean fertilizer spills unless necessary and only after the area has been thoroughly cleaned using

dry cleaning methods. Pesticides, herbicides, and fertilizers shall not be applied within 48 hours prior to rain or if wind speeds exceed 5 mph. Pesticides shall be applied only as a last resort and after other pest mitigation efforts have been attempted. Non-pesticide mitigation measures include cultural tactics (modifying routine landscape activities, adjusting the amount of irrigation applied to the area, etc.), mechanical tactics (mulching and manual removal of weeds and larger pests such as snails), environmental/ physical tactics (netting, etc.), and biological tactics (using living organisms such as lady bugs and herbivores to control pests). Storage of pesticides shall be away from living areas and in a covered area that is not subject to temperature extremes. For additional information, see BMP SC-41, Building & Grounds Maintenance, SC-73, Landscape Maintenance, and BMP SD-10, Site Design and Landscape Planning, included in Attachment A and the BMP Maintenance Responsibility/Frequency Matrix in Section V.

N4. BMP Maintenance.

Selected BMP's will be maintained to ensure proper operation and that they are properly maintained. See the BMP Maintenance Responsibility/Frequency Matrix in Section V for details. Appropriate BMP Maintenance practices will help to reduce all pollutants from the site.

N11. Common Area Litter Control. (SC-60)

The owner shall implement trash management and litter control procedures aimed at reducing pollution of storm water runoff due to trash and debris. The owner will contract with a maintenance firm to provide regularly scheduled landscape maintenance and parking lot maintenance that will include litter removal, emptying of trash receptacles, and picking up of grass and plant clippings. For additional information, see BMP SC-41, Building & Grounds Maintenance, and SC-43, Parking/Storage Area Maintenance, included in Attachment A. Also see the BMP Maintenance Responsibility/Frequency Matrix in Section V.

N12. Employee Training.

Ensuring that employees are properly trained will help to reduce all anticipated and potential pollutants from the site. All new employees will be trained on how to minimize impacts to water quality. The educational materials provided in Attachment A will be reviewed including The Ocean Begins at Your Front Door, Sewer Spill, Tips for Landscaping and Gardening, and Proper Maintenance Practices for Your Business are contained in Attachment A. Additional Education Materials to be used are, but are not limited to, SC-10, Non-Stormwater Discharges, SC-11, Spill Prevention, Control, and Cleanup, SC-34, Waste Handling and Disposal, and SC-41, Building & Grounds Maintenance. Also reference the Orange County Public Works website at http://www.ocwatersheds.com. For additional information, see the BMP Maintenance Responsibility/Frequency Matrix in Section V.

N14. Common Area Catch Basin Inspection (SC-74).

Proper maintenance of the onsite catch basins will help to reduce the amount of trash/debris and silt/sediment in runoff. The onsite catch basins shall be inspected and cleaned of any trash or debris in or around the opening prior to the rainy season (by October 1st). Thereafter, inspections will be conducted every four months. See the Maintenance Responsibility/ Frequency Matrix in Section V.

N15 Street Sweeping Private Streets and Parking Lots (SC-43 & SC-70).

Access roads and drive aisles shall be swept twice a month to remove debris or more frequently as needed. Less traffic areas to be swept once a month minimum. For additional information, see BMP SC-43, Parking/Storage Area Maintenance and BMP SC-70, Road and Street Maintenance included in Attachment A. Also see the Maintenance Responsibility/ Frequency Matrix in Section V.

IV.3.9 Structural Source Control BMPs

Fill out structural source control check box forms or provide a brief narrative explaining if Structural source controls were not used.

Structural Source Control BMPs				
Identifier	**Name**	**Check One**		**If not applicable, state brief reason**
		Included	**Not Applicable**	
S1	Provide storm drain system stenciling and signage	☒	☐	
S2	Design and construct outdoor material storage areas to reduce pollution introduction	☐	☒	No outdoor material storage areas proposed.
S3	Design and construct trash and waste storage areas to reduce pollution introduction	☐	☒	A trash enclosure already exists on the site
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	☒	☐	
S5	Protect slopes and channels and provide energy dissipation	☐	☒	No large slopes on site
	Incorporate requirements applicable to individual priority project categories (from SDRWQCB NPDES Permit)	☐	☒	Requirements applicable to individual priority project categories listed below
S6	Dock areas	☐	☒	No docks are proposed
S7	Maintenance bays	☐	☒	No maintenance bays are proposed
S8	Vehicle wash areas	☐	☒	No vehicle wash areas are proposed
S9	Outdoor processing areas	☐	☒	No outdoor processing areas are proposed
S10	Equipment wash areas	☐	☒	No equipment wash areas are proposed
S11	Fueling areas	☐	☒	No fueling areas are proposed
S12	Hillside landscaping	☐	☒	No hillside landscaping areas are proposed
S13	Wash water control for food preparation areas	☐	☒	No food prep areas are proposed
S14	Community car wash racks	☐	☒	No community wash areas are proposed

S1. Provide Storm Drain Stenciling and Signage.

The proposed drainage inlets will be stenciled with the phrase "No Dumping – Drains to Ocean". Storm drain signage will help to reduce all pollution. The storm drain signage shall be inspected once per year for legibility and re-stenciled as necessary. Stenciling should be done at minimum once every five years. See BMP SD-13, Storm Drain Signage, in Attachment A and the BMP Maintenance Responsibility/Frequency Matrix in Section V.

S4. Use Efficient Irrigation Systems & Landscape Design, Water Conservation, Smart Controllers, and Source Control.

All landscape maintenance shall be consistent with City of Irvine guidelines. Efficient irrigation practices will help to reduce pollution due to pesticides, nutrients, and sediments. General guidelines include the following: Plant vegetation that reduces water, fertilizer, herbicide, and pesticide use. Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration.

IV.4 ALTERNATIVE COMPLIANCE PLAN (IF APPLICABLE)

IV.4.1 Water Quality Credits

Description of Proposed Project		
Project Types that Qualify for Water Quality Credits (Select all that apply):		
☐ Redevelopment projects that reduce the overall impervious footprint of the project site.	☐ Brownfield redevelopment, meaning redevelopment, expansion, or reuse of real property which may be complicated by the presence or potential presence of hazardous substances, pollutants or contaminants, and which have the potential to contribute to adverse ground or surface WQ if not redeveloped.	☐ Higher density development projects which include two distinct categories (credits can only be taken for one category): those with more than seven units per acre of development (lower credit allowance); vertical density developments, for example, those with a Floor to Area Ratio (FAR) of 2 or those having more than 18 units per acre (greater credit allowance).
☐ Mixed use development, such as a combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that can demonstrate environmental benefits that would not be realized through single use projects (e.g. reduced vehicle trip traffic with the potential to reduce sources of water or air pollution).	☐ Transit-oriented developments, such as a mixed use residential or commercial area designed to maximize access to public transportation; similar to above criterion, but where the development center is within one half mile of a mass transit center (e.g. bus, rail, light rail or commuter train station). Such projects would not be able to take credit for both categories, but may have greater credit assigned	☐ Redevelopment projects in an established historic district, historic preservation area, or similar significant city area including core City Center areas (to be defined through mapping).

☐Developments with dedication of undeveloped portions to parks, preservation areas and other pervious uses.	☐ Developments in a city center area.	☐ Developments in historic districts or historic preservation areas.	☐ Live-work developments, a variety of developments designed to support residential and vocational needs together – similar to criteria to mixed use development; would not be able to take credit for both categories.	☐In-fill projects, the conversion of empty lots and other underused spaces into more beneficially used spaces, such as residential or commercial areas.
Calculation of Water Quality Credits (if applicable)				

IV.4.2 Alternative Compliance Plan Information

Not applicable. Water quality credits will not be applied for the project. LID BMPs will be utilized for water quality treatment on-site in accordance with the MS_4 Permit hierarchy identified at the beginning of this Section.

Section V Inspection/Maintenance Responsibility for BMPs

BMP Inspection/Maintenance			
BMP	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
N1 – Education of property owners, tenants, occupants	City of Irvine	Education of employees /owners shall be done within 4 weeks of start-up and continue on an annual refreshing basis with each new on-site employee/owner being given a Water Quality orientation using this WQMP as reference within two weeks of hire date.	Ongoing. Ensure all employees are adhering to the activity restrictions and are not engaged in activities that can have a negative impact on storm water.
N2 – Activity Restrictions	City of Irvine	There shall be no discharges of fertilizer, pesticides, or wastes to streets or storm drains. There shall be no blowing or sweeping of debris into storm drain. All debris shall be collected and relocated to an approved landfill.	Ongoing. Ensure all employees are adhering to the activity restrictions and are not engaged in activities that can have a negative impact on storm water.
N3 – Common area landscape management	City of Irvine	Landscape maintenance will consist of trimming and replanting of vegetation, repair and maintenance of irrigation systems, and appropriate use of fertilizers and pesticides.	Landscape maintenance shall be performed on a weekly basis. Irrigation systems shall be inspected monthly for leaks. Leaks shall be

			repaired as soon as they are observed.
N4 – BMP Maintenance	City of Irvine	The proposed treatment BMPs will be maintained as outlined in Attachment F of this report.	As outlined in Attachment F of this report.
N11 – Common area litter control	City of Irvine	The Owner will contract with a maintenance firm to provide weekly landscape maintenance and parking lot maintenance that will include litter removal and picking up grass and plant clippings. During routine maintenance, all trash and debris will be picked up and placed in waste receptacles.	Weekly

BMP Inspection/Maintenance			
BMP	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
N12 – Employee training	City of Irvine	Education of employees /owner(s) shall be done within 4 weeks of startup and continue on an annual refreshing basis with each new onsite	Ongoing. Ensure all employees are adhering to the activity restrictions and are not engaged

		employee/owner(s) being given a water quality orientation using this WQMP as reference within two weeks of hire date.	in activities that can have a negative impact on storm water.
N14 – Common area catch basin inspection	City of Irvine	Inspect area in around catch basins for trash/debris and clean as necessary but at a minimum once prior to the rainy season (by Oct. 1st)	Once prior to the rainy season (by Oct. 1st) and every four months thereafter
N15 – Street sweeping private streets and parking lots	City of Irvine	The access roads and drive aisles shall be swept on a regular basis to remove debris. (See BMP SC-43 and BMP SC-70)	Twice a month to remove debris in drive aisles/access roads or more frequently as needed. Areas with less traffic to be done a minimum of once a month
Efficient Irrigation	City of Irvine	Inspect irrigation equipment. Check water sensors and adjust irrigation heads and timing.	Monthly
Modular Wetlands Biofilters	City of Irvine	· Remove trash from screening device. · Remove sediment from separation chamber. · Replace cartridge filter media. · Replace drain down filter media. · Trim vegetation.	Annually
Storm drain stencilling	Owner	The storm drain signage shall be inspected once per year for legibility and re-stencilled as necessary	Once every year, repaint every five years at minimum

Section VI Site Plan and Drainage Plan

VI.1 SITE PLAN AND DRAINAGE PLAN

Section VII Educational Materials

Refer to the Orange County Stormwater Program (ocwatersheds.com) for a library of materials available. For the copy submitted to the Permittee, only attach the educational materials specifically applicable to the project. Other materials specific to the project may be included as well and must be attached.

Education Materials			
Residential Material (http://www.ocwatersheds.com)	**Check If Applicable**	**Business Material (http://www.ocwatersheds.com)**	**Check If Applicable**
The Ocean Begins at Your Front Door	☒	Tips for the Automotive Industry	☐
Tips for Car Wash Fund-raisers	☐	Tips for Using Concrete and Mortar	☐
Tips for the Home Mechanic	☐	Tips for the Food Service Industry	☐
Homeowners Guide for Sustainable Water Use	☐	Proper Maintenance Practices for Your Business	☒
Household Tips	☐	**Other Material**	**Check If Attached**
Proper Disposal of Household Hazardous Waste	☐		
Recycle at Your Local Used Oil Collection Center (North County)	☐	SC-10 Non-Stormwater Discharges	☒
Recycle at Your Local Used Oil Collection Center (Central County)	☐	SC-11 Spill Prevention, Control and Clean-up	☒
Recycle at Your Local Used Oil Collection Center (South County)	☐	SC-34 Waste Handling and Disposal	☒
Tips for Maintaining a Septic Tank System	☐	SC-41 Building and Grounds Maintenance	☒
Responsible Pest Control	☐		☐
Sewer Spill	☐		☐
Tips for the Home Improvement Projects	☐		☐
Tips for Horse Care	☐		☐
Tips for Landscaping and Gardening	☐		☐
Tips for Pet Care	☐		☐
Tips for Pool Maintenance	☐		☐
Tips for Residential Pool, Landscape and Hardscape Drains	☐		☐
Tips for Projects Using Paint	☐		☐

ATTACHMENT A

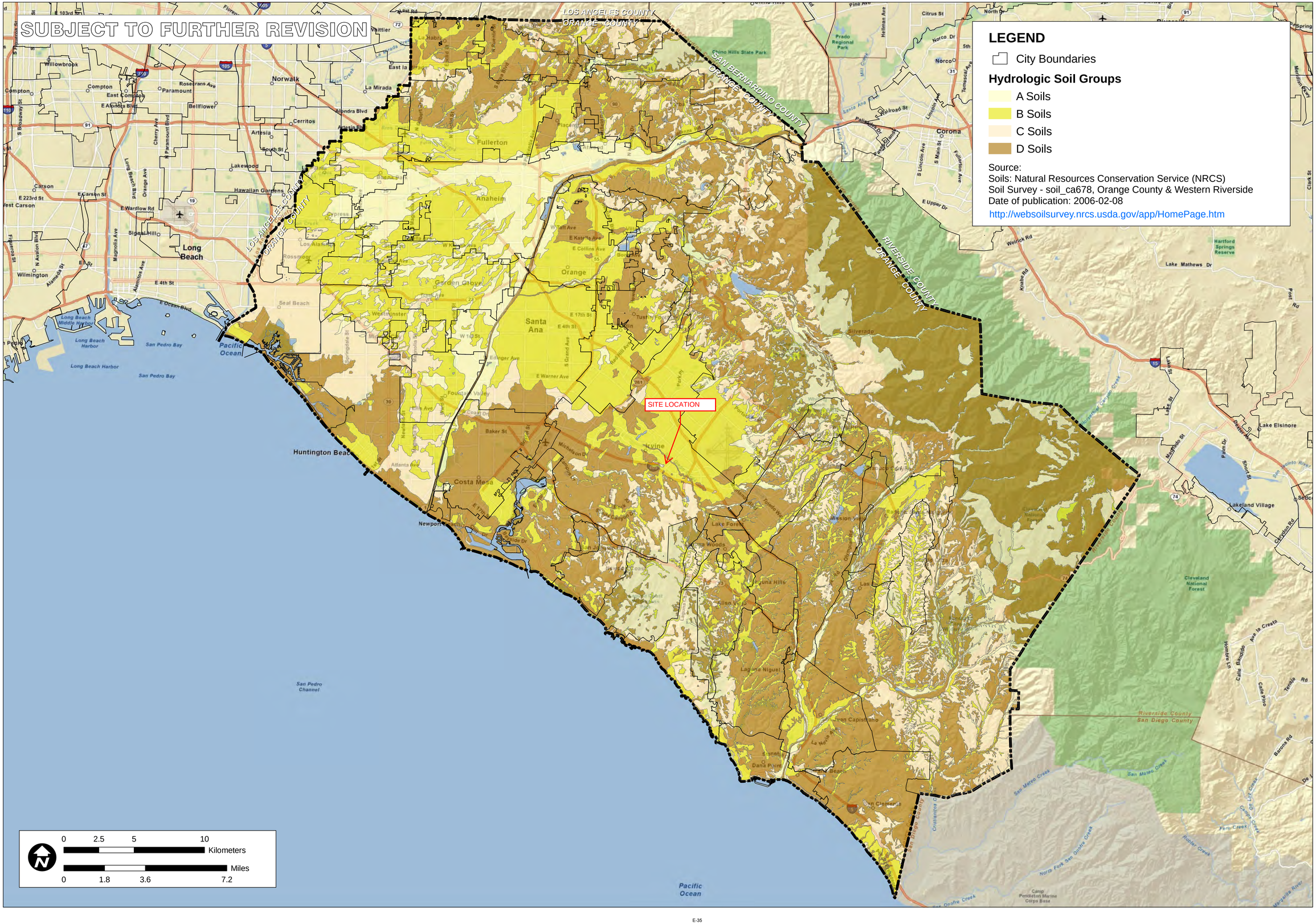
EDUCATIONAL MATERIALS

http://www.ocwatersheds.com

ATTACHMENT B

BMP CALCULATIONS

SUBJECT TO FURTHER REVISION



LEGEND

- City Boundaries

Hydrologic Soil Groups

- A Soils
- B Soils
- C Soils
- D Soils

Source:
Soils: Natural Resources Conservation Service (NRCS)
Soil Survey - soil_ca678, Orange County & Western Riverside
Date of publication: 2006-02-08
http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

0 2.5 5 10 Kilometers

0 1.8 3.6 7.2 Miles

TITLE

NRCS HYDROLOGIC SOILS GROUPS

JOB

ORANGE COUNTY INFILTRATION STUDY

ORANGE CO. CA

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	02/09/11
JOB NO.	9526-E

PACE
Advanced Water Engineering

FIGURE

XVI-2a

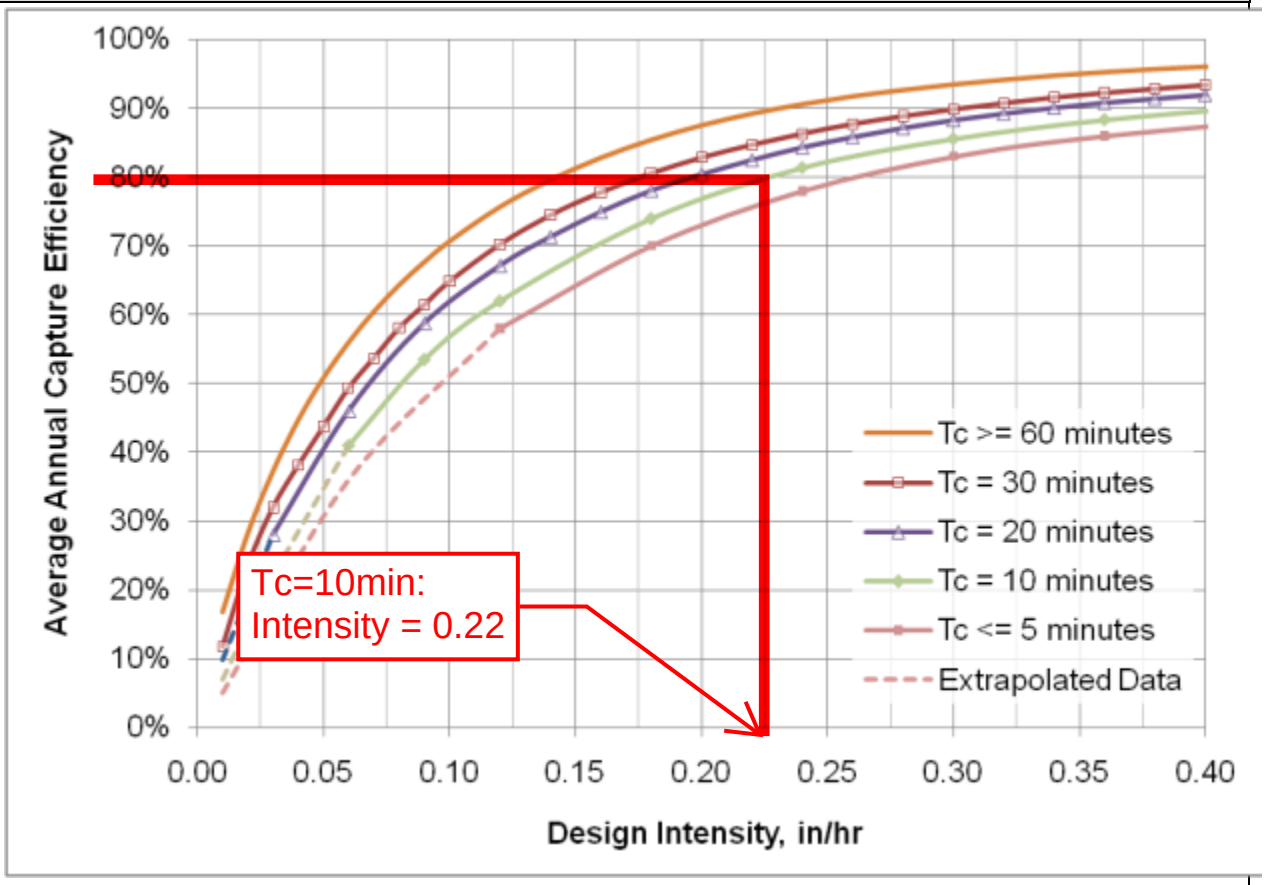
P:\9526E\6-GIS\Mxds\Reports\InfiltrationFeasability_20110215\9526E_FigureXVI-2a_HydroSoils_20110215.mxd

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter the time of concentration, T_c (min) (See **Appendix IV.2**)	T_c=	10	
2	Using **Figure III.4**, determine the design intensity at which the estimated time of concentration (T_c) achieves 80% capture efficiency, I_1	I_1=	.22	in/hr
3	Enter the effect depth of provided HSCs upstream, d_{HSC} (inches) (**Worksheet A**)	d_{HSC}=	0	inches
4	Enter capture efficiency corresponding to d_{HSC}, Y_2 (**Worksheet A**)	Y_2=	0	%
5	Using **Figure III.4**, determine the design intensity at which the time of concentration (T_c) achieves the upstream capture efficiency(Y_2), I_2	I_2=	0	
6	Determine the design intensity that must be provided by BMP, $I_{design}= I_1-I_2$	I_{design}=	.22	
Step 2: Calculate the design flowrate				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	1.71	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	.9	
3	Calculate runoff coefficient, $C= (0.75 \times imp) + 0.15$	C=	.825	
4	Calculate design flowrate, $Q_{design}= (C \times i_{design} \times A)$	Q_{design}=	0.31	cfs
Supporting Calculations				
Describe system: The Qdesign for DMA-A is 0.31. The total treatment capacity of a 8'x12' MWS unit is 0.34 CFS				
Provide time of concentration assumptions:				

Worksheet D: Capture Efficiency Method for Flow-Based BMPs

Graphical Operations



Provide supporting graphical operations. See Example III.7.

Worksheet B: Simple Design Capture Volume Sizing Method

Step 1: Determine the design capture storm depth used for calculating volume				
1	Enter design capture storm depth from Figure III.1, *d* (inches)	d=	.75	inches
2	Enter the effect of provided HSCs, d_{HSC} (inches) (Worksheet A)	d_{HSC}=		inches
3	Calculate the remainder of the design capture storm depth, $d_{remainder}$ (inches) (Line 1 – Line 2)	$d_{remainder}$=	.75	inches
Step 2: Calculate the DCV				
1	Enter Project area tributary to BMP (s), *A* (acres)	A=	1.71	acres
2	Enter Project Imperviousness, *imp* (unitless)	imp=	.9	
3	Calculate runoff coefficient, *C= (0.75 x imp) + 0.15*	C=	.25	
4	Calculate runoff volume, V_{design}= *(C x* $d_{remainder}$ *x A x 43560 x (1/12))*	V_{design}=	1163.87	cu-ft
Step 3: Design BMPs to ensure full retention of the DCV				
Step 3a: Determine design infiltration rate				
1	Enter measured infiltration rate, $K_{observed}$[1] (in/hr) (**Appendix VII**)	$K_{observed}$=		In/hr
2	Enter combined safety factor from Worksheet H, S_{total} (unitless)	S_{total}=		
3	Calculate design infiltration rate, $K_{design} = K_{observed} / S_{total}$	K_{design}=		In/hr
Step 3b: Determine minimum BMP footprint				
4	Enter drawdown time, *T* (max 48 hours)	T=		Hours
5	Calculate max retention depth that can be drawn down within the drawdown time (feet), $D_{max} = K_{design} \times T \times (1/12)$	D_{max}=		feet
6	Calculate minimum area required for BMP (sq-ft), $A_{min} = V_{design} / d_{max}$	A_{min}=		sq-ft

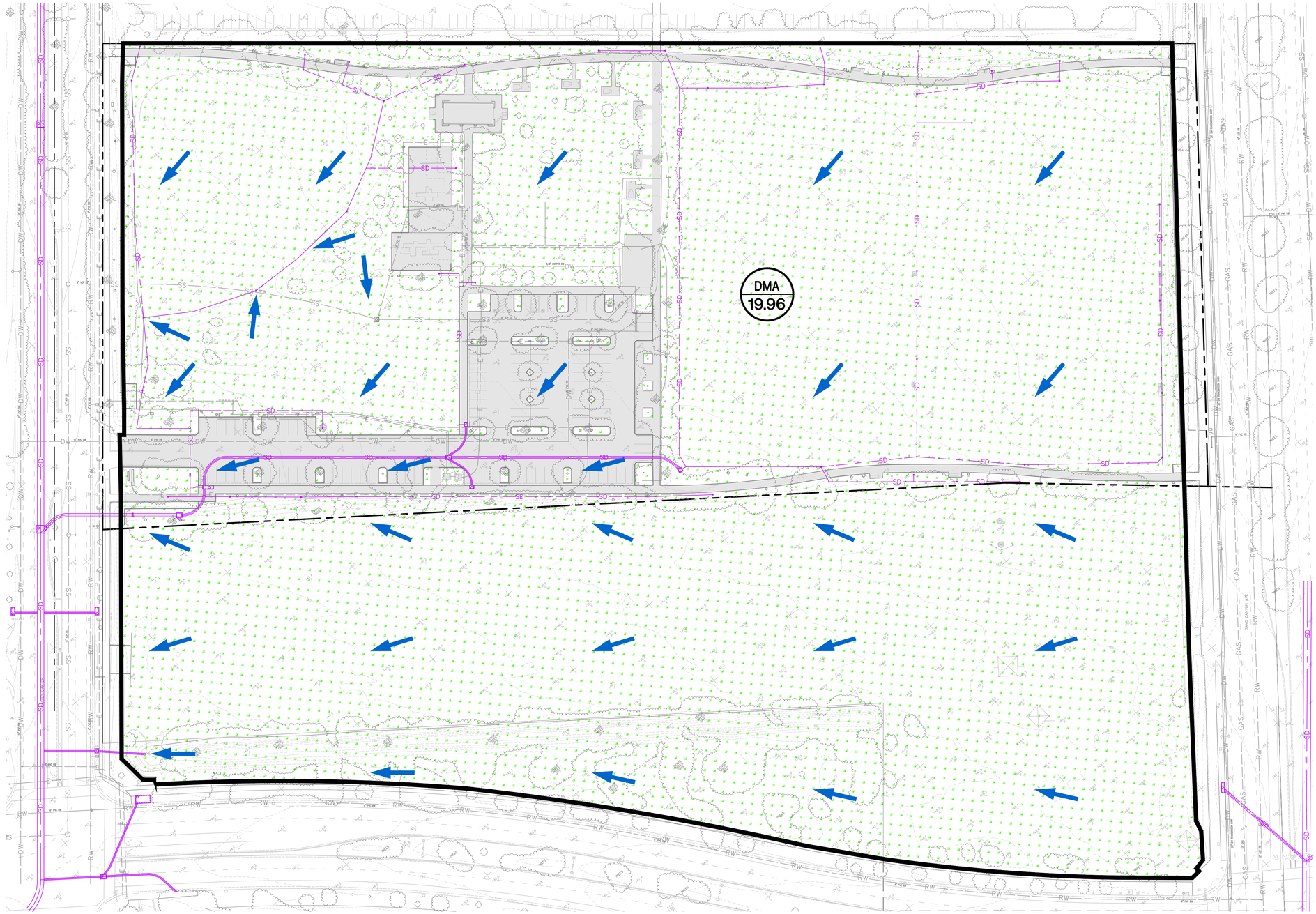
[1] $K_{observed}$ is the vertical infiltration measured in the field, before applying a factor of safety. If field testing measures a rate that is different than the vertical infiltration rate (for example, three-dimensional borehole percolation rate), then this rate must be adjusted by an acceptable method (for example, Porchet method) to yield the field estimate of vertical infiltration rate, $K_{observed}$. See Appendix VII.

MWS Linear 2.0 HGL Sizing Calculations

MWS MODEL SIZE	WETLAND PERMITER LENGTH	LOADING RATE GPM/SF	HGL HEIGHT																												
			SHALLOW MODELS																			STANDARD HEIGHT MODEL	HIGH CAPACITY MODELS									
			1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.65	3.70	3.75	3.80	3.85	3.90	3.95
MWS-L-4-4	6.70	1.0	0.022	0.023	0.025	0.026	0.028	0.029	0.031	0.032	0.034	0.035	0.037	0.038	0.040	0.042	0.043	0.045	0.046	0.048	0.049	0.051	**0.052**	0.054	0.055	0.056	0.057	0.058	0.058	0.059	0.060	0.061
MWS-L-3-6	10.06	1.0	0.032	0.035	0.037	0.039	0.042	0.044	0.046	0.048	0.051	0.053	0.055	0.058	0.060	0.062	0.065	0.067	0.069	0.072	0.074	0.076	**0.078**	0.081	0.083	0.084	0.085	0.087	0.088	0.089	0.090	0.091
MWS-L-4-6	9.30	1.0	0.030	0.032	0.034	0.036	0.038	0.041	0.043	0.045	0.047	0.049	0.051	0.053	0.055	0.058	0.060	0.062	0.064	0.066	0.068	0.070	**0.073**	0.075	0.077	0.078	0.079	0.080	0.081	0.082	0.083	0.084
MWS-L-4-8	14.80	1.0	0.048	0.051	0.054	0.058	0.061	0.065	0.068	0.071	0.075	0.078	0.082	0.085	0.088	0.092	0.095	0.099	0.102	0.105	0.109	0.112	**0.115**	0.119	0.122	0.124	0.126	0.127	0.129	0.131	0.132	0.134
MWS-L-4-13	18.40	1.0	0.059	0.063	0.068	0.072	0.076	0.080	0.084	0.089	0.093	0.097	0.101	0.106	0.110	0.114	0.118	0.122	0.127	0.131	0.135	0.139	**0.144**	0.148	0.152	0.154	0.156	0.158	0.160	0.163	0.165	0.167
MWS-L-4-15	22.40	1.0	0.072	0.077	0.082	0.087	0.093	0.098	0.103	0.108	0.113	0.118	0.123	0.129	0.134	0.139	0.144	0.149	0.154	0.159	0.165	0.170	**0.175**	0.180	0.185	0.188	0.190	0.193	0.195	0.198	0.200	0.203
MWS-L-4-17	26.40	1.0	0.085	0.091	0.097	0.103	0.109	0.115	0.121	0.127	0.133	0.139	0.145	0.151	0.158	0.164	0.170	0.176	0.182	0.188	0.194	0.200	**0.206**	0.212	0.218	0.221	0.224	0.227	0.230	0.233	0.236	0.239
MWS-L-4-19	30.40	1.0	0.098	0.105	0.112	0.119	0.126	0.133	0.140	0.147	0.153	0.160	0.167	0.174	0.181	0.188	0.195	0.202	0.209	0.216	0.223	0.230	**0.237**	0.244	0.251	0.255	0.258	0.262	0.265	0.269	0.272	0.276
MWS-L-4-21	34.40	1.0	0.111	0.118	0.126	0.134	0.142	0.150	0.158	0.166	0.174	0.182	0.189	0.197	0.205	0.213	0.221	0.229	0.237	0.245	0.253	0.261	**0.268**	0.276	0.284	0.288	0.292	0.296	0.300	0.304	0.308	0.312
MWS-L-6-8	18.80	1.0	0.060	0.065	0.069	0.073	0.078	0.082	0.086	0.091	0.095	0.099	0.104	0.108	0.112	0.116	0.121	0.125	0.129	0.134	0.138	0.142	**0.147**	0.151	0.155	0.157	0.160	0.162	0.164	0.166	0.168	0.170
MWS-L-8-8	29.60	1.0	0.095	0.102	0.109	0.115	0.122	0.129	0.136	0.143	0.149	0.156	0.163	0.170	0.177	0.183	0.190	0.197	0.204	0.211	0.217	0.224	**0.231**	0.238	0.245	0.248	0.251	0.255	0.258	0.262	0.265	0.268
MWS-L-8-12	44.40	1.0	0.143	0.153	0.163	0.173	0.183	0.194	0.204	0.214	0.224	0.234	0.245	0.255	0.265	0.275	0.285	0.296	0.306	0.316	0.326	0.336	**0.346**	0.357	0.367	0.372	0.377	0.382	0.387	0.392	0.397	0.402
MWS-L-8-16	59.20	1.0	0.190	0.204	0.217	0.231	0.245	0.258	0.272	0.285	0.299	0.312	0.326	0.340	0.353	0.367	0.380	0.394	0.408	0.421	0.435	0.448	**0.462**	0.476	0.489	0.496	0.503	0.509	0.516	0.523	0.530	0.537
MWS-L-8-20	74.00	1.0	0.238	0.255	0.272	0.289	0.306	0.323	0.340	0.357	0.374	0.391	0.408	0.425	0.442	0.459	0.476	0.493	0.509	0.526	0.543	0.560	**0.577**	0.594	0.611	0.620	0.628	0.637	0.645	0.654	0.662	0.671
MWS-L-10-20 or MWS-L-8-24	88.80	1.0	0.285	0.306	0.326	0.346	0.367	0.387	0.408	0.428	0.448	0.469	0.489	0.509	0.530	0.550	0.571	0.591	0.611	0.632	0.652	0.673	**0.693**	0.713	0.734	0.744	0.754	0.764	0.774	0.785	0.795	0.805
4'x'4 media cage	14.80	1.0	0.048	0.051	0.054	0.058	0.061	0.065	0.068	0.071	0.075	0.078	0.082	0.085	0.088	0.092	0.095	0.099	0.102	0.105	0.109	0.112	**0.115**	0.119	0.122	0.124						

ATTACHMENT C

BMP SITE PLAN



LEGEND

- BMP CATCHMENT AREA
- SD — EXISTING STORM DRAIN
- DIRECTION OF FLOW
- PERVIOUS AREAS
- IMPERVIOUS AREAS
- DMA-X / X.XX — DRAINAGE AREA / AREA (ACRE)

50' 25' 0' 50' 100'

GRAPHIC SCALE: 1"=50'

DRAINAGE AREAS

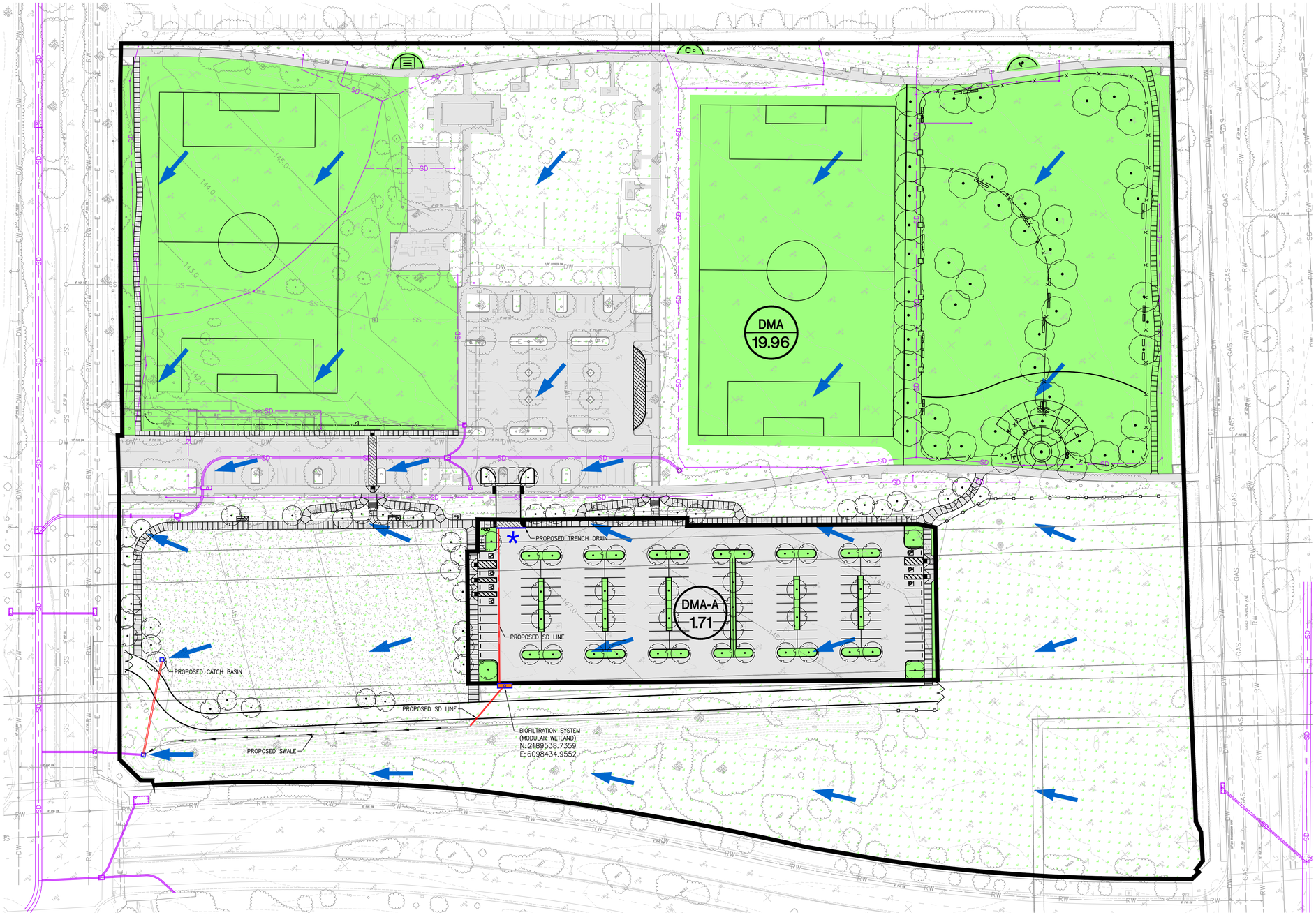
DRAINAGE AREA	AREA (ACRE)	IMPERVIOUS AREA (ACRE)	PERVIOUS AREA (ACRE)	% IMPERVIOUS	% PERVIOUS
TOTAL	19.10	2.00	17.10	11	89

CITY OF IRVINE
OAK CREEK COMMUNITY PARK

WQMP EXHIBIT
EXISTING CONDITION

JOB NO.:	19-2260
DATE:	4/7/2022
DRAWNED BY:	GC
DESIGNED BY:	GC
APPROVED BY:	MO

SHEET 1 OF 2



LEGEND

- BMP CATCHMENT AREA
- SD — EXISTING STORM DRAIN
- SD — PROPOSED STORM DRAIN
- PROPOSED STORM DRAIN INLET
- * CATCH BASIN STENCILING
- DIRECTION OF FLOW
- PERVIOUS AREA
- COMMON AREA EFFICIENT IRRIGATION AND RUN–OFF MINIMIZING LANDSCAPE
- IMPERVIOUS AREA
- BIOFILTRATION SYSTEM (BIOCLEAN MODULAR WETLAND SYSTEM)

DMA-X / X.XX — DRAINAGE AREA / AREA (ACRE)

50' 25' 0' 50' 100'

GRAPHIC SCALE: 1"=50'

DRAINAGE AREAS

DRAINAGE AREA	AREA (ACRE)	IMPERVIOUS AREA (ACRE)	PERVIOUS AREA (ACRE)	% IMPERVIOUS	% PERVIOUS
TOTAL	19.10	3.97	15.13	21	79

CITY OF IRVINE
OAK CREEK COMMUNITY PARK

WQMP EXHIBIT
PROPOSED CONDITION

JOB NO.:	19–2260
DATE:	4/7/2022
DRAWNED BY:	GC
DESIGNED BY:	GC
APPROVED BY:	MO
SHEET	2 OF 2

ATTACHMENT D

HYDROMODIFICATION CALCULATIONS

Susceptibility

Potential Areas of Erosion, Habitat, & Physical Structure Susceptibility

Channel Type

- Earth (Unstable)
- Earth (Stabilized)
- Stabilized

Tidal Influence

- <= Mean High Water Line (4.28')

Water Body

- Basin
- Dam
- Lake
- Reservoir

Other Lands

- Airport/Military

AnaheimBay-HuntingtonHarbor Watershed

Santa Ana River Watershed

Santa Ana River Watershed

South Orange County

SITE LOCATION

El Modena-Irvine Retarding Basin

Lower Peters Canyon Retarding Basin

Eastfoot Retarding Basin

Orchard Estates Retention Basin

Hicks Canyon Retarding Basin

Rattlesnake Reservoir

East Hicks Canyon Retarding Basin

Siphon Reservoir

Bee Canyon Retarding Basin

Round Canyon Retarding Basin

Marshburn Retarding Basin

Agua Chinon Retarding Basin

North Lake

South Lake

Basin Number 2

Basin Number 1

Sand Canyon Reservoir

Laguna Reservoir

Bonita Canyon Reservoir

San Joaquin Reservoir

Big Canyon Reservoir

Harbor View Dam

Village Pond Park

John Wayne Airport

Santa Ana

Costa Mesa

Newport Beach

Irvine

Orange

Norwalk

Fullerton

Corona

Laguna Hills

Laguna Beach

Laguna Niguel

Rancho Santa Margarita

Mission Viejo

Lake Forest

Huntington Beach

Sunset Beach

Seal Beach

Los Alamitos

Cypress

La Habra

Brea

Placentia

Yorba Linda

Anaheim

Buena Park

La Mirada

Whittier

Pico Rivera

Santa Fe Springs

Hacienda Heights

Rowland Heights

South Whittier

Diamond Bar

Chino Hills

Chino Airport

Pomona

Pedley

Norco

Glen Avon

Mira Loma

Jurupa Valley

Riverside

Eastvale

Corona

Home Gardens

Lake Elsinore

Temecula

Murrieta

Wildomar

Menifee

Moreno Valley

Perris

Hemet

San Jacinto

Beaumont

Banning

Cabazon

Calimesa

Yucaipa

Redlands

Loma Linda

Grand Terrace

Colton

Rialto

Fontana

Bloomington

Jurupa Valley

Ontario

Upland

Montclair

Chino

Chino Hills

Cucamonga Peak

Mount Baldy

San Antonio Peak

Mount Baldy

Cucamonga Peak

Mount Baldy

Mount Baldy

Mount Baldy

```
**************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2008 Advanced Engineering Software (aes)
              Ver. 15.0  Release Date: 04/01/2008  License ID 1204

                           Analysis prepared by:

                         ADAMS STREETER CIVIL ENGINEERS
                       16755 VON KARMAN AVENUE, SUITE 150
                               IRVINE, CA 92606
                                (949) 474-2330

 ************************** DESCRIPTION OF STUDY **************************
* 2-YEAR STORM EVENT HYDROLOGY ANALYSIS                                  *
* OAKCREEK COMMUNITY PARK, IRVINE CALIFORNIA                             *
* EXISTING CONDITION                                                     *
 **************************************************************************

  FILE NAME: OAK02EXA.DAT
  TIME/DATE OF STUDY: 15:59 04/04/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)   (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   251.00
  ELEVATION DATA: UPSTREAM(FEET) =    157.60  DOWNSTREAM(FEET) =    151.80
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.355
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.580
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.07      0.30     0.850    36    9.36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.08
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.08

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  41
----------------------------------------------------------------------------
  ** WARNING: Computed Flowrate is less than 0.1 cfs,
               Routing Algorithm is UNAVAILABLE.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.36
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.580
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.24      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.24      SUBAREA RUNOFF(CFS) =    0.29
  EFFECTIVE AREA(ACRES) =      0.31   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.37

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   363.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   2.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.12
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.37
  PIPE TRAVEL TIME(MIN.) =   1.47    Tc(MIN.) =   10.82
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     614.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.82
```

```
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.453
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.46      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      0.77   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.8       PEAK FLOW RATE(CFS) =       0.83

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.11
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.83
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   11.14
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     711.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.14
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.429
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.11      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.12
  EFFECTIVE AREA(ACRES) =      0.88   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.9       PEAK FLOW RATE(CFS) =       0.93

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.25
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.93
```

```
 PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   11.57
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     846.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.57
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.399
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.77      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.77      SUBAREA RUNOFF(CFS) =    0.79
 EFFECTIVE AREA(ACRES) =      1.65   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        1.6       PEAK FLOW RATE(CFS) =       1.70

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.08
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.70
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.58
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =     851.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.58
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.398
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        3.91      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    3.91      SUBAREA RUNOFF(CFS) =    4.02
 EFFECTIVE AREA(ACRES) =      5.56   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        5.6       PEAK FLOW RATE(CFS) =       5.72

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  REPRESENTATIVE SLOPE =  0.0111
  FLOW LENGTH(FEET) =   231.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.00
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.72
  PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =   12.22
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1082.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.22
  RAINFALL INTENSITY(INCH/HR) =   1.36
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.85
  EFFECTIVE STREAM AREA(ACRES) =       5.56
  TOTAL STREAM AREA(ACRES) =       5.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.72

****************************************************************************
  FLOW PROCESS FROM NODE      8.10 TO NODE      8.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.00  DOWNSTREAM(FEET) =    144.55

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.542
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.475
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.76      0.30      0.850    36   10.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.83
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      0.83

****************************************************************************
  FLOW PROCESS FROM NODE      8.20 TO NODE      8.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.010
```

```
 DEPTH OF FLOW IN   8.0 INCH PIPE IS   3.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.10
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.83
 PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   11.09
 LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =     467.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.09
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.433
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.60      0.30      0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    0.76
 EFFECTIVE AREA(ACRES) =      1.36   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       1.56

****************************************************************************
 FLOW PROCESS FROM NODE      8.30 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0077
 FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.74
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.56
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   11.25
 LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.00 =     504.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.25
 RAINFALL INTENSITY(INCH/HR) =   1.42
 AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.52
 EFFECTIVE STREAM AREA(ACRES) =       1.36
 TOTAL STREAM AREA(ACRES) =       1.36
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.56

****************************************************************************
```

```
 FLOW PROCESS FROM NODE      8.40 TO NODE      8.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   252.00
 ELEVATION DATA: UPSTREAM(FEET) =    147.00  DOWNSTREAM(FEET) =    142.68

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.261
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.990
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 B        0.44      0.30     0.100    36    6.26
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.78
 TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      0.78

****************************************************************************
 FLOW PROCESS FROM NODE      8.50 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0557
 FLOW LENGTH(FEET) =    37.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.13
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.78
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    6.36
 LONGEST FLOWPATH FROM NODE      8.40 TO NODE      8.00 =     289.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.36
 RAINFALL INTENSITY(INCH/HR) =   1.97
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.44
 TOTAL STREAM AREA(ACRES) =       0.44
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.78

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        5.72   12.22    1.355  0.30( 0.26) 0.85       5.6       1.00
     2        1.56   11.25    1.421  0.30( 0.16) 0.52       1.4       8.10
```

```
    3        0.78    6.36    1.971  0.30( 0.03) 0.10       0.4       8.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        6.69    6.36    1.971  0.30( 0.21) 0.71       4.1       8.40
      2        7.70   11.25    1.421  0.30( 0.22) 0.74       6.9       8.10
      3        7.73   12.22    1.355  0.30( 0.22) 0.74       7.4       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.73    Tc(MIN.) =    12.22
  EFFECTIVE AREA(ACRES) =       7.36   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
  TOTAL AREA(ACRES) =        7.4
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1082.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =   261.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.85
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.73
  PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =   13.12
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1343.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.12
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.301
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.52      0.30     0.100    36
  PUBLIC PARK                B        3.04      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.740
  SUBAREA AREA(ACRES) =    3.56      SUBAREA RUNOFF(CFS) =    3.46
  EFFECTIVE AREA(ACRES) =     10.92   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
  TOTAL AREA(ACRES) =       10.9       PEAK FLOW RATE(CFS) =      10.60

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       11.08    7.29    1.823  0.30( 0.22) 0.72       7.7       8.40
```

```
      2       10.74   12.15    1.360  0.30( 0.22) 0.74      10.5       8.10
      3       10.60   13.12    1.301  0.30( 0.22) 0.74      10.9       1.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      11.08  Tc(MIN.) =    7.29
  AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.72  EFFECTIVE AREA(ACRES) =       7.66

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.29
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.823
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.31      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.31      SUBAREA RUNOFF(CFS) =    0.44
  EFFECTIVE AREA(ACRES) =      7.97   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.73
  TOTAL AREA(ACRES) =       11.2       PEAK FLOW RATE(CFS) =      11.51

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.31
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.51
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    7.43
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    1388.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    43.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.80
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.51
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    7.54
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     11.00 =    1431.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  41
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    93.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.80
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.51
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    7.77
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =    1525.60 FEET.
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =     2.35
 ELEVATION DATA: UPSTREAM(FEET) =    154.00  DOWNSTREAM(FEET) =    149.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL POOR COVER
 "BARREN"                   B        0.63      0.30     1.000    72    5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.11
 TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      1.11

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    149.00  DOWNSTREAM(FEET) =    139.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   858.00   CHANNEL SLOPE =  0.0106
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.11
 FLOW VELOCITY(FEET/SEC) =   1.58 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   9.07   Tc(MIN.) =   14.07
 LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =     860.35 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.07
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.250
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "BARREN"                   B        4.59      0.30     1.000    72
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    4.59      SUBAREA RUNOFF(CFS) =    3.92
 EFFECTIVE AREA(ACRES) =      5.22   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =       4.46

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.07
  RAINFALL INTENSITY(INCH/HR) =   1.25
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       5.22
  TOTAL STREAM AREA(ACRES) =       5.22
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.46

********************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     23.20 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   285.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.80  DOWNSTREAM(FEET) =    147.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.521
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.337
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                    B        0.84      0.30     1.000    72   12.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.78
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      0.78

********************************************************************************
  FLOW PROCESS FROM NODE     23.20 TO NODE     23.00 IS CODE =  52
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    147.80  DOWNSTREAM(FEET) =    139.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   791.00   CHANNEL SLOPE =  0.0100
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.78
  FLOW VELOCITY(FEET/SEC) =   1.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.79   Tc(MIN.) =   21.32
  LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1076.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   21.32
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.985
  SUBAREA LOSS RATE DATA(AMC  I ):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                     B        1.81      0.30      1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    1.12
  EFFECTIVE AREA(ACRES) =      2.65   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       1.63

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   21.32
  RAINFALL INTENSITY(INCH/HR) =   0.98
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       2.65
  TOTAL STREAM AREA(ACRES) =       2.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.63

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        4.46   14.07    1.250  0.30( 0.30) 1.00       5.2      21.00
      2        1.63   21.32    0.985  0.30( 0.30) 1.00       2.6      23.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.96   14.07    1.250  0.30( 0.30) 1.00       7.0      21.00
      2        4.85   21.32    0.985  0.30( 0.30) 1.00       7.9      23.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.96    Tc(MIN.) =    14.07
  EFFECTIVE AREA(ACRES) =       6.97   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.9
  LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1076.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
```

```
  FLOW LENGTH(FEET) =    45.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.89
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.96
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   14.20
  LONGEST FLOWPATH FROM NODE     23.10 TO NODE     24.00 =    1121.70 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =         7.9  TC(MIN.) =     14.20
  EFFECTIVE AREA(ACRES) =      6.97  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       5.96

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.96   14.20    1.243  0.30( 0.30) 1.00       7.0      21.00
      2        4.85   21.45    0.981  0.30( 0.30) 1.00       7.9      23.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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                           Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* 2-YEAR STORM EVENT HYDROLOGY ANYLYSIS                                  *
* OAKCREEK COMMUNITY PARK, IRVINE CALIFORNIA                             *
* PROPOSED CONDITION                                                     *
 **************************************************************************

  FILE NAME: OAK02PRA.DAT
  TIME/DATE OF STUDY: 16:01 04/04/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)   (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   251.00
  ELEVATION DATA: UPSTREAM(FEET) =    157.00  DOWNSTREAM(FEET) =    151.80
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.562
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.560
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.07      0.30     0.850    36    9.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.08
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.08

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  41
----------------------------------------------------------------------------
  ** WARNING: Computed Flowrate is less than 0.1 cfs,
               Routing Algorithm is UNAVAILABLE.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.56
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.560
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.24      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.24      SUBAREA RUNOFF(CFS) =    0.28
  EFFECTIVE AREA(ACRES) =      0.31   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.36

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   363.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   2.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.06
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.36
  PIPE TRAVEL TIME(MIN.) =   1.49    Tc(MIN.) =   11.05
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     614.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.05
```

```
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.436
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               B        2.53      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    2.53      SUBAREA RUNOFF(CFS) =    2.69
  EFFECTIVE AREA(ACRES) =      2.84   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       3.02

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.65
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.02
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.24
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     711.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.24
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.422
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               B        0.25      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.26
  EFFECTIVE AREA(ACRES) =      3.09   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       3.25

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.30
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
```

```
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.25
 PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   11.48
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     846.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.48
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.405
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.71      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.71      SUBAREA RUNOFF(CFS) =    0.73
 EFFECTIVE AREA(ACRES) =      3.80   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =       3.93

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.48
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.93
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.49
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =     851.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.49
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.404
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        2.01      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    2.01      SUBAREA RUNOFF(CFS) =    2.08
 EFFECTIVE AREA(ACRES) =      5.81   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =       6.01

****************************************************************************
```

```
 FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0111
 FLOW LENGTH(FEET) =   231.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.08
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.01
 PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =   12.12
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1082.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.12
 RAINFALL INTENSITY(INCH/HR) =   1.36
 AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.85
 EFFECTIVE STREAM AREA(ACRES) =       5.81
 TOTAL STREAM AREA(ACRES) =       5.81
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.01

****************************************************************************
 FLOW PROCESS FROM NODE      8.10 TO NODE      8.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =    150.00  DOWNSTREAM(FEET) =    144.55

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.542
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.475
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 PUBLIC PARK                B        0.76      0.30     0.850    36   10.54
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA RUNOFF(CFS) =      0.83
 TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      0.83

****************************************************************************
 FLOW PROCESS FROM NODE      8.20 TO NODE      8.30 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN   8.0 INCH PIPE IS   3.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.10
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.83
 PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   11.09
 LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =     467.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.09
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.433
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.51      0.30     0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.51      SUBAREA RUNOFF(CFS) =    0.64
 EFFECTIVE AREA(ACRES) =      1.27   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       1.45

****************************************************************************
 FLOW PROCESS FROM NODE      8.30 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0077
 FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.66
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.45
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   11.26
 LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.00 =     504.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.26
 RAINFALL INTENSITY(INCH/HR) =   1.42
 AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.55
 EFFECTIVE STREAM AREA(ACRES) =       1.27
 TOTAL STREAM AREA(ACRES) =       1.27
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.45
```

```
****************************************************************************
 FLOW PROCESS FROM NODE      8.40 TO NODE      8.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   255.00
 ELEVATION DATA: UPSTREAM(FEET) =    147.00  DOWNSTREAM(FEET) =    142.68

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.305
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.982
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 B        0.45      0.30      0.100    36    6.31
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.79
 TOTAL AREA(ACRES) =      0.45   PEAK FLOW RATE(CFS) =      0.79

****************************************************************************
 FLOW PROCESS FROM NODE      8.50 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0557
 FLOW LENGTH(FEET) =    37.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.14
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.79
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    6.41
 LONGEST FLOWPATH FROM NODE      8.40 TO NODE      8.00 =     292.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.41
 RAINFALL INTENSITY(INCH/HR) =   1.96
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.45
 TOTAL STREAM AREA(ACRES) =       0.45
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.79

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
```

```
    1        6.01   12.12    1.361  0.30( 0.26) 0.85       5.8       1.00
    2        1.45   11.26    1.421  0.30( 0.16) 0.55       1.3       8.10
    3        0.79    6.41    1.963  0.30( 0.03) 0.10       0.4       8.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.87    6.41    1.963  0.30( 0.22) 0.72       4.2       8.40
      2        7.90   11.26    1.421  0.30( 0.22) 0.75       7.1       8.10
      3        7.93   12.12    1.361  0.30( 0.23) 0.75       7.5       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.93    Tc(MIN.) =    12.12
  EFFECTIVE AREA(ACRES) =       7.53   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =        7.5
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1082.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =   261.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.88
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.93
  PIPE TRAVEL TIME(MIN.) =   0.89    Tc(MIN.) =   13.01
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1343.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.01
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.307
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.50      0.30      0.100    36
  PUBLIC PARK                B        3.13      0.30      0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.747
  SUBAREA AREA(ACRES) =    3.63      SUBAREA RUNOFF(CFS) =    3.54
  EFFECTIVE AREA(ACRES) =     11.16   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =       11.2       PEAK FLOW RATE(CFS) =      10.86

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1       11.32    7.33    1.817  0.30( 0.22) 0.73       7.9       8.40
    2       10.98   12.15    1.360  0.30( 0.22) 0.75      10.7       8.10
    3       10.86   13.01    1.307  0.30( 0.23) 0.75      11.2       1.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      11.32  Tc(MIN.) =    7.33
 AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.73  EFFECTIVE AREA(ACRES) =       7.87

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.33
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.817
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.33      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    0.46
 EFFECTIVE AREA(ACRES) =      8.20   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
 TOTAL AREA(ACRES) =       11.5       PEAK FLOW RATE(CFS) =      11.79

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.33
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.817
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.22      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.31
 EFFECTIVE AREA(ACRES) =      8.42   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
 TOTAL AREA(ACRES) =       11.7       PEAK FLOW RATE(CFS) =      12.10

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.36
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.10
```

```
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    7.47
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    1388.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    43.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.90
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.10
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    7.58
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     11.00 =    1431.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    93.90   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.90
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.10
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    7.80
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =    1525.60 FEET.
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   314.00
 ELEVATION DATA: UPSTREAM(FEET) =    154.00  DOWNSTREAM(FEET) =    148.60

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.799
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.383
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL POOR COVER
 "BARREN"                   B        0.88      0.30     1.000    72   11.80
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.86
 TOTAL AREA(ACRES) =      0.88   PEAK FLOW RATE(CFS) =      0.86

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.50 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    148.60  DOWNSTREAM(FEET) =    143.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   472.00   CHANNEL SLOPE =  0.0100
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.86
 FLOW VELOCITY(FEET/SEC) =   1.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   5.26   Tc(MIN.) =   17.05
 LONGEST FLOWPATH FROM NODE     21.00 TO NODE     22.50 =     786.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.05
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.119
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.48      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.48      SUBAREA RUNOFF(CFS) =    0.37
 EFFECTIVE AREA(ACRES) =      1.36   AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.95
 TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       1.02

****************************************************************************
 FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.05
  RAINFALL INTENSITY(INCH/HR) =   1.12
  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.95
  EFFECTIVE STREAM AREA(ACRES) =       1.36
  TOTAL STREAM AREA(ACRES) =       1.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.02

********************************************************************************
  FLOW PROCESS FROM NODE     22.51 TO NODE     22.52 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   283.30
  ELEVATION DATA: UPSTREAM(FEET) =    150.40  DOWNSTREAM(FEET) =    147.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.224
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.833
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.71      0.30     0.100    36    7.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.15
  TOTAL AREA(ACRES) =      0.71   PEAK FLOW RATE(CFS) =      1.15

********************************************************************************
  FLOW PROCESS FROM NODE     22.52 TO NODE     22.53 IS CODE =  61
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
================================================================================
  REPRESENTATIVE SLOPE =  0.0050
  STREET LENGTH(FEET) =   220.70   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.73
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.90
```

```
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.58
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   2.33   Tc(MIN.) =    9.56
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.561
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.84      0.30     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    1.16
  EFFECTIVE AREA(ACRES) =      1.55    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       2.14

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.82
  FLOW VELOCITY(FEET/SEC.) =  1.66   DEPTH*VELOCITY(FT*FT/SEC.) =   0.57
  LONGEST FLOWPATH FROM NODE     22.51 TO NODE     22.53 =     504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.53 TO NODE     22.53 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.56
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.561
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.15      0.30     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.21
  EFFECTIVE AREA(ACRES) =      1.70   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       2.34

****************************************************************************
  FLOW PROCESS FROM NODE     22.53 TO NODE     22.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.64
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.34
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    9.74
  LONGEST FLOWPATH FROM NODE     22.51 TO NODE     22.50 =     554.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.74
  RAINFALL INTENSITY(INCH/HR) =   1.54
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.70
  TOTAL STREAM AREA(ACRES) =       1.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.34

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.02   17.05    1.119  0.30( 0.28) 0.95       1.4      21.00
      2        2.34    9.74    1.544  0.30( 0.03) 0.10       1.7      22.51

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        3.22    9.74    1.544  0.30( 0.11) 0.37       2.5      22.51
      2        2.71   17.05    1.119  0.30( 0.14) 0.48       3.1      21.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.22    Tc(MIN.) =     9.74
  EFFECTIVE AREA(ACRES) =       2.48   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =        3.1
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     22.50 =     786.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    143.90  DOWNSTREAM(FEET) =    139.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   325.40   CHANNEL SLOPE =  0.0126
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.22
  FLOW VELOCITY(FEET/SEC) =   2.14 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.53   Tc(MIN.) =   12.27
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =    1111.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.27
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.352
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)   (INCH/HR)   (DECIMAL)  CN
  PUBLIC PARK              B        0.25      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.25
  EFFECTIVE AREA(ACRES) =      2.73   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =       3.22
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.27
  RAINFALL INTENSITY(INCH/HR) =   1.35
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.41
  EFFECTIVE STREAM AREA(ACRES) =       2.73
  TOTAL STREAM AREA(ACRES) =       3.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.22

****************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     23.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   285.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.80  DOWNSTREAM(FEET) =    147.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.521
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.337
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)   (INCH/HR)   (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        0.84      0.30     1.000    72   12.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.78
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      0.78

****************************************************************************
  FLOW PROCESS FROM NODE     23.20 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    147.80  DOWNSTREAM(FEET) =    139.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   815.80   CHANNEL SLOPE =  0.0101
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
```

```
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.78
 FLOW VELOCITY(FEET/SEC) =   1.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   9.04   Tc(MIN.) =   21.56
 LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1100.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   21.56
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.978
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "BARREN"                    B        1.81      0.30     1.000    72
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    1.11
 EFFECTIVE AREA(ACRES) =      2.65   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       1.62

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   21.56
 RAINFALL INTENSITY(INCH/HR) =   0.98
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       2.65
 TOTAL STREAM AREA(ACRES) =       2.65
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.62

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        3.22   12.27    1.352  0.30( 0.12) 0.41       2.7      22.51
     1        2.71   19.69    1.031  0.30( 0.15) 0.50       3.3      21.00
     2        1.62   21.56    0.978  0.30( 0.30) 1.00       2.6      23.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        4.65   12.27    1.352  0.30( 0.19) 0.62       4.2      22.51
     2        4.30   19.69    1.031  0.30( 0.21) 0.71       5.7      21.00
     3        4.16   21.56    0.978  0.30( 0.22) 0.72       6.0      23.10
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.65    Tc(MIN.) =    12.27
  EFFECTIVE AREA(ACRES) =       4.23   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.62
  TOTAL AREA(ACRES) =        6.0
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =    1111.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.27
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.352
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        1.49      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    1.49      SUBAREA RUNOFF(CFS) =    1.47
  EFFECTIVE AREA(ACRES) =      5.72   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =        7.4       PEAK FLOW RATE(CFS) =       5.92

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    45.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.88
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.92
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   12.40
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     24.00 =    1157.10 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        7.4  TC(MIN.) =     12.40
  EFFECTIVE AREA(ACRES) =      5.72  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.680
  PEAK FLOW RATE(CFS)   =       5.92

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.92   12.40    1.344  0.30( 0.20) 0.68       5.7      22.51
      2        5.25   19.82    1.027  0.30( 0.22) 0.74       7.2      21.00
      3        5.05   21.70    0.975  0.30( 0.22) 0.75       7.4      23.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Appendix I

Proposed Q_{10} Hydrology Calculations

```
**************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2008 Advanced Engineering Software (aes)
              Ver. 15.0  Release Date: 04/01/2008  License ID 1204

                              Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* 10-YEAR STORM EVENT HYDROLOGY ANALYSIS                                  *
* OAKCREEK COMMUNITY PARK, IRVINE CALIFORNIA                              *
* PROPOSED CONDITION                                                      *
 **************************************************************************

  FILE NAME: OAK10PRA.DAT
  TIME/DATE OF STUDY: 16:13 04/04/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   251.00
  ELEVATION DATA: UPSTREAM(FEET) =    157.00  DOWNSTREAM(FEET) =    151.80
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.562
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.800
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.07      0.30     0.850    56    9.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =    49.40   MANNING'S N =  0.010
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.30
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.16
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =    9.81
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     300.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.81
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.759
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.24      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.24      SUBAREA RUNOFF(CFS) =    0.54
  EFFECTIVE AREA(ACRES) =      0.31   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.70

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   363.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   3.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.88
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.70
```

```
 PIPE TRAVEL TIME(MIN.) =   1.24    Tc(MIN.) =   11.05
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     663.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.05
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.577
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        2.53      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    2.53      SUBAREA RUNOFF(CFS) =    5.29
 EFFECTIVE AREA(ACRES) =      2.84   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       5.94

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.010
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.00
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.94
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.15
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     760.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.15
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.564
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.25      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.52
 EFFECTIVE AREA(ACRES) =      3.09   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       6.42

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  41
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.40
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.42
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   11.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     895.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.27
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.548
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.71      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.71      SUBAREA RUNOFF(CFS) =    1.47
  EFFECTIVE AREA(ACRES) =      3.80   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =       7.84

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.99
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.84
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.28
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =     900.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.28
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.547
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK              B        2.01      0.30      0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    2.01      SUBAREA RUNOFF(CFS) =    4.15
  EFFECTIVE AREA(ACRES) =      5.81   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      11.99

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0111
  FLOW LENGTH(FEET) =   231.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.30
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.99
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   11.80
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1131.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.80
  RAINFALL INTENSITY(INCH/HR) =   2.48
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.85
  EFFECTIVE STREAM AREA(ACRES) =       5.81
  TOTAL STREAM AREA(ACRES) =       5.81
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.99

****************************************************************************
  FLOW PROCESS FROM NODE      8.10 TO NODE      8.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.00  DOWNSTREAM(FEET) =    144.55

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.542
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.648
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK              B        0.76      0.30      0.850    56   10.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      1.64
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      1.64

****************************************************************************
  FLOW PROCESS FROM NODE      8.20 TO NODE      8.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   5.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.92
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.64
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   11.01
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =     467.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.01
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.582
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.51      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.51      SUBAREA RUNOFF(CFS) =    1.17
  EFFECTIVE AREA(ACRES) =      1.27   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       2.76

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0077
  FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.39
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.76
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   11.15
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.00 =     504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.15
 RAINFALL INTENSITY(INCH/HR) =   2.56
 AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.55
 EFFECTIVE STREAM AREA(ACRES) =       1.27
 TOTAL STREAM AREA(ACRES) =       1.27
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.76

****************************************************************************
 FLOW PROCESS FROM NODE      8.40 TO NODE      8.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   255.00
 ELEVATION DATA: UPSTREAM(FEET) =    147.00  DOWNSTREAM(FEET) =    142.68

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.305
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.554
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 B        0.45      0.30      0.100    56    6.31
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.43
 TOTAL AREA(ACRES) =      0.45   PEAK FLOW RATE(CFS) =      1.43

****************************************************************************
 FLOW PROCESS FROM NODE      8.50 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0557
 FLOW LENGTH(FEET) =    37.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.34
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.43
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    6.39
 LONGEST FLOWPATH FROM NODE      8.40 TO NODE      8.00 =     292.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.39
 RAINFALL INTENSITY(INCH/HR) =   3.53
```

```
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.45
 TOTAL STREAM AREA(ACRES) =       0.45
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.43

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       11.99   11.80    2.482  0.30( 0.26) 0.85       5.8       1.00
     2        2.76   11.15    2.563  0.30( 0.16) 0.55       1.3       8.10
     3        1.43    6.39    3.527  0.30( 0.03) 0.10       0.4       8.40

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       13.18    6.39    3.527  0.30( 0.22) 0.72       4.3       8.40
     2       15.54   11.15    2.563  0.30( 0.23) 0.75       7.2       8.10
     3       15.66   11.80    2.482  0.30( 0.23) 0.75       7.5       1.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      15.66    Tc(MIN.) =    11.80
 EFFECTIVE AREA(ACRES) =       7.53   AREA-AVERAGED Fm(INCH/HR) =  0.23
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
 TOTAL AREA(ACRES) =        7.5
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1131.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =   261.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.98
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.66
 PIPE TRAVEL TIME(MIN.) =   0.87    Tc(MIN.) =   12.68
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1392.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.68
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.382
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
 COMMERCIAL                 B        0.50      0.30     0.100    56
 PUBLIC PARK                B        3.13      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.747
 SUBAREA AREA(ACRES) =    3.63      SUBAREA RUNOFF(CFS) =    7.05
 EFFECTIVE AREA(ACRES) =     11.16   AREA-AVERAGED Fm(INCH/HR) =  0.23
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
 TOTAL AREA(ACRES) =       11.2       PEAK FLOW RATE(CFS) =      21.66

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       22.02    7.19    3.297  0.30( 0.22) 0.73       8.0       8.40
     2       21.75   12.03    2.454  0.30( 0.22) 0.75      10.8       8.10
     3       21.66   12.68    2.382  0.30( 0.23) 0.75      11.2       1.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      22.02  Tc(MIN.) =    7.19
 AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.73  EFFECTIVE AREA(ACRES) =       7.95

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.19
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.297
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.33      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    0.90
 EFFECTIVE AREA(ACRES) =      8.28   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
 TOTAL AREA(ACRES) =       11.5       PEAK FLOW RATE(CFS) =      22.93

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.19
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.297
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.22      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.60
 EFFECTIVE AREA(ACRES) =      8.50   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
 TOTAL AREA(ACRES) =       11.7       PEAK FLOW RATE(CFS) =      23.53

****************************************************************************
```

```
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.49
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      23.53
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    7.29
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    1437.40 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    43.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  15.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.29
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      23.53
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    7.38
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     11.00 =    1481.10 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    93.90   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  15.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.29
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      23.53
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    7.57
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =    1575.00 FEET.
======================================================================
======================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   314.00
 ELEVATION DATA: UPSTREAM(FEET) =    154.00  DOWNSTREAM(FEET) =    148.60

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.799
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.482
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL POOR COVER
 "BARREN"                   B        0.88      0.30     1.000    86   11.80
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.73
 TOTAL AREA(ACRES) =      0.88   PEAK FLOW RATE(CFS) =      1.73

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.50 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    148.60  DOWNSTREAM(FEET) =    143.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   472.00   CHANNEL SLOPE =  0.0100
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.73
 FLOW VELOCITY(FEET/SEC) =   1.67 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   4.72   Tc(MIN.) =   16.52
 LONGEST FLOWPATH FROM NODE     21.00 TO NODE     22.50 =     786.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.52
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.047
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.48      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.48      SUBAREA RUNOFF(CFS) =    0.77
 EFFECTIVE AREA(ACRES) =      1.36   AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.95
 TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       2.16

****************************************************************************
 FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.52
  RAINFALL INTENSITY(INCH/HR) =   2.05
  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.95
  EFFECTIVE STREAM AREA(ACRES) =       1.36
  TOTAL STREAM AREA(ACRES) =       1.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.16

****************************************************************************
  FLOW PROCESS FROM NODE     22.51 TO NODE     22.52 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   283.30
  ELEVATION DATA: UPSTREAM(FEET) =    150.40  DOWNSTREAM(FEET) =    147.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.224
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.288
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.71      0.30     0.100    56    7.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.08
  TOTAL AREA(ACRES) =      0.71   PEAK FLOW RATE(CFS) =      2.08

****************************************************************************
  FLOW PROCESS FROM NODE     22.52 TO NODE     22.53 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  STREET LENGTH(FEET) =   220.70   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.15
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.70
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.82
```

```
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.69
 STREET FLOW TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =    9.24
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.855
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.84      0.30      0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    2.14
 EFFECTIVE AREA(ACRES) =      1.55    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       3.94

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  13.95
 FLOW VELOCITY(FEET/SEC.) =  1.91   DEPTH*VELOCITY(FT*FT/SEC.) =   0.77
 LONGEST FLOWPATH FROM NODE     22.51 TO NODE     22.53 =     504.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.53 TO NODE     22.53 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.24
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.855
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.15      0.30      0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.38
 EFFECTIVE AREA(ACRES) =      1.70   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       4.32

****************************************************************************
 FLOW PROCESS FROM NODE     22.53 TO NODE     22.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.41
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.32
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    9.40
 LONGEST FLOWPATH FROM NODE     22.51 TO NODE     22.50 =     554.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.40
  RAINFALL INTENSITY(INCH/HR) =   2.83
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.70
  TOTAL STREAM AREA(ACRES) =       1.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.32

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.16   16.52    2.047  0.30( 0.28) 0.95       1.4      21.00
      2        4.32    9.40    2.828  0.30( 0.03) 0.10       1.7      22.51

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.09    9.40    2.828  0.30( 0.11) 0.36       2.5      22.51
      2        5.27   16.52    2.047  0.30( 0.14) 0.48       3.1      21.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       6.09    Tc(MIN.) =     9.40
  EFFECTIVE AREA(ACRES) =       2.47   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =        3.1
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     22.50 =     786.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    143.90  DOWNSTREAM(FEET) =    139.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   325.40   CHANNEL SLOPE =  0.0126
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.09
  FLOW VELOCITY(FEET/SEC) =   2.48 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.18   Tc(MIN.) =   11.58
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =    1111.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.58
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.508
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  PUBLIC PARK                B        0.25      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.51
  EFFECTIVE AREA(ACRES) =      2.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =       6.09
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.58
  RAINFALL INTENSITY(INCH/HR) =   2.51
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.41
  EFFECTIVE STREAM AREA(ACRES) =       2.72
  TOTAL STREAM AREA(ACRES) =       3.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.09

****************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     23.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   285.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.80  DOWNSTREAM(FEET) =    147.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.521
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.399
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        0.84      0.30     1.000    86   12.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.59
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      1.59

****************************************************************************
  FLOW PROCESS FROM NODE     23.20 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    147.80  DOWNSTREAM(FEET) =    139.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   815.80   CHANNEL SLOPE =  0.0101
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.59
  FLOW VELOCITY(FEET/SEC) =   1.65 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
 TRAVEL TIME(MIN.) =   8.26   Tc(MIN.) =   20.78
 LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1100.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   20.78
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.794
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "BARREN"                    B        1.81      0.30     1.000    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    2.43
 EFFECTIVE AREA(ACRES) =      2.65   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       3.56

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   20.78
 RAINFALL INTENSITY(INCH/HR) =   1.79
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       2.65
 TOTAL STREAM AREA(ACRES) =       2.65
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.56

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        6.09   11.58    2.508  0.30( 0.12) 0.41       2.7      22.51
     1        5.27   18.78    1.902  0.30( 0.15) 0.50       3.3      21.00
     2        3.56   20.78    1.794  0.30( 0.30) 1.00       2.6      23.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        9.03   11.58    2.508  0.30( 0.19) 0.62       4.2      22.51
     2        8.72   18.78    1.902  0.30( 0.21) 0.71       5.7      21.00
     3        8.51   20.78    1.794  0.30( 0.22) 0.72       6.0      23.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
 PEAK FLOW RATE(CFS) =       9.03    Tc(MIN.) =    11.58
 EFFECTIVE AREA(ACRES) =       4.20   AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.62
 TOTAL AREA(ACRES) =        6.0
 LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =    1111.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.58
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.508
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        1.49      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    1.49      SUBAREA RUNOFF(CFS) =    3.02
 EFFECTIVE AREA(ACRES) =      5.69   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.68
 TOTAL AREA(ACRES) =        7.4       PEAK FLOW RATE(CFS) =      11.81

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    45.70   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.68
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.81
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   11.70
 LONGEST FLOWPATH FROM NODE     21.00 TO NODE     24.00 =    1157.10 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        7.4  TC(MIN.) =     11.70
 EFFECTIVE AREA(ACRES) =      5.69  AREA-AVERAGED Fm(INCH/HR)=  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.678
 PEAK FLOW RATE(CFS)   =      11.81

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       11.81   11.70    2.494  0.30( 0.20) 0.68       5.7      22.51
     2       10.87   18.91    1.895  0.30( 0.22) 0.74       7.2      21.00
     3       10.52   20.91    1.788  0.30( 0.22) 0.75       7.4      23.10
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

Appendix J

Proposed Q_{25} Hydrology Calculations

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2008 Advanced Engineering Software (aes)
             Ver. 15.0  Release Date: 04/01/2008  License ID 1204

                          Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* 25-YEAR STORM EVENT HYDROLOGY ANALYSIS                                  *
* OAKCREEK COMMUNITY PARK, IRVINE CALIFORNIA                              *
* PROPOSED CONDITION                                                      *
 **************************************************************************

  FILE NAME: OAK25PRA.DAT
  TIME/DATE OF STUDY: 16:23 04/04/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)   (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   251.00
  ELEVATION DATA: UPSTREAM(FEET) =    157.00  DOWNSTREAM(FEET) =    151.80
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.562
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.342
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.07      0.30     0.850    56    9.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =    49.40   MANNING'S N =  0.010
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.46
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.19
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    9.80
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     300.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.80
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.296
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.24      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.24      SUBAREA RUNOFF(CFS) =    0.66
  EFFECTIVE AREA(ACRES) =      0.31   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.85

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   363.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.13
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.85
```

```
 PIPE TRAVEL TIME(MIN.) =   1.18    Tc(MIN.) =   10.98
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     663.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.98
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.090
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        2.53      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    2.53      SUBAREA RUNOFF(CFS) =    6.46
 EFFECTIVE AREA(ACRES) =      2.84   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       7.25

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.010
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.76
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.25
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   11.06
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     760.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.06
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.078
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.25      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.64
 EFFECTIVE AREA(ACRES) =      3.09   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       7.85

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  41
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.49
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.85
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.16
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     895.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.16
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.062
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.71      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.71      SUBAREA RUNOFF(CFS) =    1.79
  EFFECTIVE AREA(ACRES) =      3.80   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =       9.60

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.22
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.60
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.16
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =     900.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.16
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.061
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK              B        2.01      0.30      0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    2.01      SUBAREA RUNOFF(CFS) =    5.08
  EFFECTIVE AREA(ACRES) =      5.81   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      14.67

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0111
  FLOW LENGTH(FEET) =   231.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.66
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.67
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =   11.67
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1131.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.67
  RAINFALL INTENSITY(INCH/HR) =   2.99
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.85
  EFFECTIVE STREAM AREA(ACRES) =       5.81
  TOTAL STREAM AREA(ACRES) =       5.81
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.67

****************************************************************************
  FLOW PROCESS FROM NODE      8.10 TO NODE      8.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.00  DOWNSTREAM(FEET) =    144.55

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.542
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.162
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK              B        0.76      0.30      0.850    56   10.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      1.99
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      1.99

****************************************************************************
  FLOW PROCESS FROM NODE      8.20 TO NODE      8.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.70
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.99
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   11.03
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =     467.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.03
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.082
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.51      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.51      SUBAREA RUNOFF(CFS) =    1.40
  EFFECTIVE AREA(ACRES) =      1.27   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       3.33

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0077
  FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.62
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.33
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   11.16
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.00 =     504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
==========================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.16
  RAINFALL INTENSITY(INCH/HR) =   3.06
  AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.55
  EFFECTIVE STREAM AREA(ACRES) =       1.27
  TOTAL STREAM AREA(ACRES) =       1.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.33

**************************************************************************
  FLOW PROCESS FROM NODE      8.40 TO NODE      8.50 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   255.00
  ELEVATION DATA: UPSTREAM(FEET) =    147.00  DOWNSTREAM(FEET) =    142.68

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.305
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.230
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.45      0.30     0.100    56    6.31
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.70
  TOTAL AREA(ACRES) =      0.45   PEAK FLOW RATE(CFS) =      1.70

**************************************************************************
  FLOW PROCESS FROM NODE      8.50 TO NODE      8.00 IS CODE =  41
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  REPRESENTATIVE SLOPE =  0.0557
  FLOW LENGTH(FEET) =    37.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.75
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.70
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    6.39
  LONGEST FLOWPATH FROM NODE      8.40 TO NODE      8.00 =     292.70 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.39
```

```
 RAINFALL INTENSITY(INCH/HR) =   4.20
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.45
 TOTAL STREAM AREA(ACRES) =       0.45
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.70

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       14.67   11.67    2.986  0.30( 0.26) 0.85       5.8       1.00
     2        3.33   11.16    3.061  0.30( 0.16) 0.55       1.3       8.10
     3        1.70    6.39    4.200  0.30( 0.03) 0.10       0.4       8.40

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       15.96    6.39    4.200  0.30( 0.22) 0.72       4.4       8.40
     2       19.00   11.16    3.061  0.30( 0.23) 0.75       7.3       8.10
     3       19.13   11.67    2.986  0.30( 0.23) 0.75       7.5       1.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      19.13    Tc(MIN.) =    11.67
 EFFECTIVE AREA(ACRES) =       7.53   AREA-AVERAGED Fm(INCH/HR) =  0.23
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
 TOTAL AREA(ACRES) =        7.5
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1131.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =   261.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.09
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      19.13
 PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =   12.38
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1392.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.38
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.887
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               B        0.50      0.30      0.100    56
  PUBLIC PARK              B        3.13      0.30      0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.747
  SUBAREA AREA(ACRES) =    3.63      SUBAREA RUNOFF(CFS) =    8.70
  EFFECTIVE AREA(ACRES) =     11.16   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =       11.2       PEAK FLOW RATE(CFS) =      26.73

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       26.53    7.24    3.911  0.30( 0.22) 0.73       8.0       8.40
      2       26.81   11.88    2.955  0.30( 0.22) 0.75      10.9       8.10
      3       26.73   12.38    2.887  0.30( 0.23) 0.75      11.2       1.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      26.81  Tc(MIN.) =   11.88
  AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.75  EFFECTIVE AREA(ACRES) =      10.91

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.88
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK              B        0.33      0.30      0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    0.80
  EFFECTIVE AREA(ACRES) =     11.24   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =       11.5       PEAK FLOW RATE(CFS) =      27.61

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.88
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK              B        0.22      0.30      0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.53
  EFFECTIVE AREA(ACRES) =     11.46   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =       11.7       PEAK FLOW RATE(CFS) =      28.14
```

```
 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       28.34    7.24    3.911  0.30( 0.22) 0.74       8.5       8.40
     2       28.14   11.88    2.955  0.30( 0.23) 0.75      11.5       8.10
     3       28.04   12.38    2.887  0.30( 0.23) 0.76      11.7       1.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      28.34  Tc(MIN.) =    7.24
 AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.74  EFFECTIVE AREA(ACRES) =       8.54

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.02
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      28.34
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.33
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    1437.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    43.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  16.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.71
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      28.34
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.41
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     11.00 =    1481.10 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    93.90   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  16.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.71
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      28.34
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    7.59
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =    1575.00 FEET.
============================================================================
```

==========

END OF RATIONAL METHOD ANALYSIS

```
****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   314.00
  ELEVATION DATA: UPSTREAM(FEET) =    154.00  DOWNSTREAM(FEET) =    148.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.799
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.967
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        0.88      0.30     1.000    86   11.80
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.11
  TOTAL AREA(ACRES) =      0.88   PEAK FLOW RATE(CFS) =      2.11

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    148.60  DOWNSTREAM(FEET) =    143.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   472.00   CHANNEL SLOPE =  0.0100
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.11
  FLOW VELOCITY(FEET/SEC) =   1.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.53   Tc(MIN.) =   16.33
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     22.50 =     786.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.33
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.469
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.48      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.48      SUBAREA RUNOFF(CFS) =    0.96
  EFFECTIVE AREA(ACRES) =      1.36   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       2.67

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.33
  RAINFALL INTENSITY(INCH/HR) =   2.47
  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.95
  EFFECTIVE STREAM AREA(ACRES) =       1.36
  TOTAL STREAM AREA(ACRES) =       1.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.67

****************************************************************************
  FLOW PROCESS FROM NODE     22.51 TO NODE     22.52 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   283.30
  ELEVATION DATA: UPSTREAM(FEET) =    150.40  DOWNSTREAM(FEET) =    147.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.224
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.917
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.71      0.30     0.100    56    7.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.48
  TOTAL AREA(ACRES) =      0.71   PEAK FLOW RATE(CFS) =      2.48

****************************************************************************
  FLOW PROCESS FROM NODE     22.52 TO NODE     22.53 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  STREET LENGTH(FEET) =   220.70   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.77
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.63
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.91
```

```
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.76
  STREET FLOW TRAVEL TIME(MIN.) =   1.93   Tc(MIN.) =    9.15
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.426
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.84      0.30      0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    2.57
  EFFECTIVE AREA(ACRES) =      1.55    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       4.74

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.96
  FLOW VELOCITY(FEET/SEC.) =  2.01   DEPTH*VELOCITY(FT*FT/SEC.) =   0.86
  LONGEST FLOWPATH FROM NODE     22.51 TO NODE     22.53 =     504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.53 TO NODE     22.53 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.15
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.426
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.15      0.30      0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.46
  EFFECTIVE AREA(ACRES) =      1.70   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       5.20

****************************************************************************
  FLOW PROCESS FROM NODE     22.53 TO NODE     22.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.60
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.20
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    9.30
  LONGEST FLOWPATH FROM NODE     22.51 TO NODE     22.50 =     554.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.30
  RAINFALL INTENSITY(INCH/HR) =   3.39
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.70
  TOTAL STREAM AREA(ACRES) =       1.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.20

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.67   16.33    2.469  0.30( 0.28) 0.95       1.4      21.00
      2        5.20    9.30    3.394  0.30( 0.03) 0.10       1.7      22.51

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.36    9.30    3.394  0.30( 0.11) 0.37       2.5      22.51
      2        6.44   16.33    2.469  0.30( 0.14) 0.48       3.1      21.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.36    Tc(MIN.) =     9.30
  EFFECTIVE AREA(ACRES) =       2.47   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =        3.1
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     22.50 =     786.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    143.90  DOWNSTREAM(FEET) =    139.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   325.40   CHANNEL SLOPE =  0.0126
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.36
  FLOW VELOCITY(FEET/SEC) =   2.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.09   Tc(MIN.) =   11.39
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =    1111.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.027
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  PUBLIC PARK                B        0.25      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.62
  EFFECTIVE AREA(ACRES) =      2.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =       7.36
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.39
  RAINFALL INTENSITY(INCH/HR) =   3.03
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.41
  EFFECTIVE STREAM AREA(ACRES) =       2.72
  TOTAL STREAM AREA(ACRES) =       3.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.36

****************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     23.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   285.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.80  DOWNSTREAM(FEET) =    147.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.521
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.869
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        0.84      0.30     1.000    86   12.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.94
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      1.94

****************************************************************************
  FLOW PROCESS FROM NODE     23.20 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    147.80  DOWNSTREAM(FEET) =    139.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   815.80   CHANNEL SLOPE =  0.0101
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.94
  FLOW VELOCITY(FEET/SEC) =   1.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
 TRAVEL TIME(MIN.) =   7.93   Tc(MIN.) =   20.45
 LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1100.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   20.45
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.173
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "BARREN"                    B        1.81      0.30     1.000    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    3.05
 EFFECTIVE AREA(ACRES) =      2.65   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       4.47

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   20.45
 RAINFALL INTENSITY(INCH/HR) =   2.17
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       2.65
 TOTAL STREAM AREA(ACRES) =       2.65
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.47

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        7.36   11.39    3.027  0.30( 0.12) 0.41       2.7      22.51
     1        6.44   18.48    2.301  0.30( 0.15) 0.50       3.3      21.00
     2        4.47   20.45    2.173  0.30( 0.30) 1.00       2.6      23.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       10.99   11.39    3.027  0.30( 0.19) 0.62       4.2      22.51
     2       10.75   18.48    2.301  0.30( 0.21) 0.71       5.7      21.00
     3       10.52   20.45    2.173  0.30( 0.22) 0.72       6.0      23.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =      10.99    Tc(MIN.) =    11.39
  EFFECTIVE AREA(ACRES) =       4.20   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.62
  TOTAL AREA(ACRES) =        6.0
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =    1111.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.027
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        1.49      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    1.49      SUBAREA RUNOFF(CFS) =    3.72
  EFFECTIVE AREA(ACRES) =      5.69   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =        7.4       PEAK FLOW RATE(CFS) =      14.46

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    45.70   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.18
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.46
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   11.48
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     24.00 =    1157.10 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        7.4  TC(MIN.) =     11.48
  EFFECTIVE AREA(ACRES) =      5.69  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.678
  PEAK FLOW RATE(CFS)   =      14.46

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1       14.46   11.48    3.013  0.30( 0.20) 0.68       5.7       22.51
      2       13.46   18.58    2.294  0.30( 0.22) 0.74       7.2       21.00
      3       13.06   20.55    2.167  0.30( 0.22) 0.75       7.4       23.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

ATTACHMENT E

ORANGE COUNTY RAINFALL ZONES MAP

SUBJECT TO FURTHER REVISION

LEGEND

- Orange County Precipitation Stations
- 24 Hour, 85th Percentile Rainfall (Inches)
- 24 Hour, 85th Percentile Rainfall (Inches) - Extrapolated
- City Boundaries

Rainfall Zones

Design Capture Storm Depth (inches)

- 0.65"
- 0.7
- 0.75
- 0.80
- 0.85
- 0.90
- 0.95
- 1.00
- 1.10"

Note: Events defined as 24-hour periods (calendar days) with greater than 0.1 inches of rainfall.
For areas outside of available data coverage, professional judgment shall be applied.

0.65 0.7 0.75 0.8 0.85 0.9 0.95 1 1.05 1.1

SITE LOCATION

LOS ANGELES COUNTY
ORANGE COUNTY
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
Pacific Ocean
San Pedro Bay
San Pedro Channel
Long Beach Harbor
Riverside County
San Diego County

0 3 6 12 Kilometers
0 1.8 3.6 7.2 Miles

P:\19526E\16-GIS\Mxds\Reports\InfiltrationFeasability_20110215\19526E_FigureXVI-1_RainfallZones_20110215.mxd

TITLE: RAINFALL ZONES

JOB: ORANGE COUNTY TECHNICAL GUIDANCE DOCUMENT — ORANGE CO. — CA

SCALE	1" = 1.8 miles
DESIGNED	TH
DRAWING	TH
CHECKED	BMP
DATE	04/22/10
JOB NO.	19526-E

PACE Advanced Water Engineering

FIGURE XVI-1

Appendix F Preliminary Hydrology Report

Appendix

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PRELIMINARY HYDROLOGY REPORT

Project Name:

OAK CREEK COMMUNITY PARK

15616 Valley Oak Drive
Irvine, California CA 92618

Prepared for:

City of Irvine

Community Services Department
One Civic Center Plaza
Irvine, CA 92623-9575

Prepared by:

Adams Streeter Civil Engineers

16755 Von Karman Ave. Suite 150
Irvine, CA 92606
(949) 474-2330

APRIL 2022



ADAMS STREETER
Civil Engineers

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SECTION B APPENDIX ATTACHMENTS

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B. **Topographic Survey Map**
C. **National Flood Hazard Layer Firmette**
D. **Hydrologic Classification of Soils**
E. **Existing Q_2 Hydrology Calculations**
F. **Existing Q_{10} Hydrology Calculations**
G. **Existing Q_{25} Hydrology Calculations**
H. **Proposed Q_2 Hydrology Calculations**
I. **Proposed Q_{10} Hydrology Calculations**
J. **Proposed Q_{25} Hydrology Calculations**
K. **Hydrology Map – Existing Condition**
L. **Hydrology Map – Proposed Condition**
M. **Record Drawing Permit No. 30010-TC Storm Drain Improvement Line "B", Sheet 16 of 40.**
N. **Record Drawing Project No. 34071-MC Valley Oak Plan and Profile Storm Drain Improvement Plan for Line "B" Laterals, Sheet 7 of 15.**
O. **Record Drawing Grading Permit No. 4319-CCG, Sheet No. CE-09 and CE-10**

I. INTRODUCTION

This preliminary report is prepared for the City of Irvine Community Services Department as part of the effort to expand the existing facilities at the Oak Creek Community Park located at 15616 Valley Oak Drive in the City of Irvine, California (refer to the Vicinity Map in Appendix A). The project site is bounded by Sand Canyon Avenue to the southeast, Valley Oak Drive to the northwest, Barranca Parkway to the southwest, and corporate offices to the northeast. The existing park facilities that include a baseball field, two soccer fields, a children's playground area, a flat grassy play area, a restroom building, a picnic shelter, BBQ grills, picnic tables and a paved parking lot are all located at the northerly portion of the site. The southerly portion of the site is owned by Southern California Edison (SCE) and is currently undeveloped. The proposed expansion of park facilities would include improvements within SCE's property.

The purpose of this report is to provide a hydrologic evaluation of both existing and proposed (post improvement) conditions to estimate peak storm runoff values to support the design of proposed storm drainage and water quality facilities. The project site is located within Zone X per the FEMA Map reference in Appendix C.

II. EXISTING DRAINAGE CONDITION

Existing site topography generally slopes in a westerly direction with elevations ranging from 141.3 to 156 feet above sea level (MSL). No off-site drainage is anticipated to contribute to on-site run-off as shown on the Preliminary Existing Condition Hydrology Map (PECHM) provided in Appendix K.

Drainage from the northerly half of the developed park site is captured by various on-site catch basins and inlets into an existing on-site storm drain line that runs along the park's existing asphalt drive and parking area. This storm drain line is shown on the AS-BUILT reference plans provided in Appendix M as Lateral "B-5", Appendix N as Lateral "B-3A", and Appendix O as Line "A". For consistency, this report will refer to this storm drain line as Line "A".

On-site drainage is conveyed by Line "A" to an existing 78" RCP storm drain line in Valley Oak Drive, as shown on the AS-BUILT reference plans provided in Appendix M and N as Line "B". For consistency, this report will refer to this storm drain line as Line "B".

Drainage from the southerly half of the undeveloped park site within SCE's property is captured by an existing 24" CSP riser inlet located at the westerly corner of the site and conveyed by an existing 18" RCP pipe to Line "B" in Valley Oak Drive. This 18" pipe is shown on the AS-BUILT reference plans provided in Appendix N as Lateral "B-1". For consistency, this report will refer to this storm drain lateral as Line "C".

III. PROPOSED DRAINAGE CONDITION

The proposed drainage condition includes provisions to capture and treat run-off from both the northerly and southerly portions of the park site. Minor improvements are proposed for the northerly portion of park site that includes the conversion of the existing baseball field into a synthetic turf soccer field, the conversion of the existing soccer field located at the southeasterly corner of the site into a dog park, and miscellaneous sidewalk and hardscape related improvements. Proposed improvements for the southerly portion of the park site within SCE's property includes an asphalt parking lot with landscape islands, an open turf field, miscellaneous sidewalk, ramps, and steps to facilitate non-ADA and ADA access. Storm drain improvements consisting of a trench drain and 18" RCP pipe conveys drainage from the proposed parking lot to a water quality unit. Treated and overflow runoff from the water quality unit drains towards the westerly corner of the site and is captured by the existing 24" CSP riser that conveys runoff via Line "C" to Line "B" in Valley Oak Drive. Existing drainage patterns will be maintained for the proposed condition as the site is already tabled for draining into the existing 78" RCP pipe (or Line "B") located in Valley Oak Drive. The Proposed Condition Hydrology Map depicting the drainage patterns and peak flow values is shown on the Preliminary Proposed Condition Hydrology Map (PPCHM) provided in Appendix L.

IV. HYDROLOGY ANALYSIS

A. METHODOLOGY

Hydrologic calculations to determine the storm frequency design discharges for this project were performed using the Orange County Rational Method. The Rational Method equation relates rainfall intensity, runoff coefficient and drainage area size to compute the drainage area peak runoff. Guidelines and parameters that relate to the Rational Method are as follows:

- The rational method equation is only applicable where the rainfall intensity can be assumed to be uniformly distributed over the drainage area at a uniform rate throughout the duration of the storm.
- The equation includes the element of the soil surface characteristics. The Soils Group Map from the Hydrology Manual indicates the existing soils of the project consist primarily of soil type "B" (see Appendix D). Soil ratings are based on a scale of "A" to "D", where "A" is the most pervious. The soil pervious rate is also affected by the type of vegetation and/or ground cover, and the percentage of impervious surface such as asphalt concrete paving, etc.
- The nomograph used to determine the time of concentration of the initial area is

based on the Kirpich formula. The Hydrology Manual specifies that the initial area shall be less than 10 acres and the flow path less than 300 feet.

- Standard intensity-duration curve date was taken from the Orange County Hydrology Manual, dated October 1986.

- For hydrology computations, Antecedent Moisture Content (AMC) I is utilized for 2-year storm events, AMC II is utilized for 10-year and 25-year storm events, and AMC III is utilized for 100-year storm events.

- Land use categories utilized in the computations includes *Commercial* (applicable to paved street for existing and proposed condition), B*arren* for area in the existing SCE site, and *Park Facilities for existing and proposed turf fields*.

Site hydrology was analyzed using the Advance Engineering Software (AES) software package for Orange County, which complies with the County of Orange Hydrology Manual. The software computes peak flows based on the Rational Method and conforms to the County of Orange Hydrology Manual.

B. DESIGN ASSUMPTIONS AND OBJECTIVES

A site hydrology analysis was performed to include the following:

- Delineation of on-site drainage tributary areas based on the proposed grading scheme for the project site and location of drainage inlets and/or drainage convergence points.
- Determination of 2-year, 10-year, and 25-year frequency storm design discharges. The 2-year frequency storm design discharges are computed to support water quality related calculations as provided in the Water Quality Management Plan (WQMP) for the project.
- Peak runoff for design and sizing of proposed storm drain facilities are dependent on parameters such as drainage path lengths, ground and pipe slopes, type and condition of the runoff surface, proposed land use and soil type. Pipe travel times were calculated based actual pipe sizes provided by the AS-BUILT reference plans.

Existing condition drainage patterns for the project site were determined utilizing the following information:

- Topographic Survey (see Appendix B).
- Record Drawings for Line “A” Storm Drain Improvements (see Appendix M, N, O).
- FEMA Flood Map (see Appendix C).

Existing and proposed drainage patterns are plotted on the PECHM and PPCHM

provided in Appendix K and Appendix L respectively. For modeling purposes, the site and all tributary drainage areas are further divided into smaller drainage subareas to more accurately model drainage patterns within the project site. All areas and flow information are utilized for input into the AES software to determine peak flowrates for both existing and proposed conditions.

C. SUMMARY OF RESULTS

The AES software calculations that indicate the existing and proposed condition peak flow rates based on the 2-year, 10-year, 25-year are provided in the Appendix E through Appendix J of this report. The 2-year storm event calculations are provided for water quality computations purposes only. The existing condition estimated subarea peak runoff corresponding to the 2-year, 10-year and 25-year storm event is summarized by Table I below.

TABLE I
EXISTING CONDITION ESTIMATED SUBAREA PEAK RUNOFF

Drainage Sub-Area	Area (Acres)	Q_2 (CFS)	Q_{10} (CFS)	Q_{25} (CFS)	TC_{25} (Minutes)
Subarea A	11.23	11.51	22.25	26.74	7.41
Subarea B	7.87	5.96	12.73	15.80	12.74
Total	**19.10**	**17.47**	**34.98**	**42.54**	**-**

As shown on the PECHM in Appendix K and summarized by Table I above, a peak runoff of about 42.5 CFS based on the 25-year storm event is conveyed from the park site to Line "B", the 78" RCP storm drain pipe in Valley Oak Drive. About 26.4 CFS of on-site drainage contributions to Line "B" is conveyed by Line "A" with the balance of 15.8 CFS conveyed by Line "C". As shown on the PECHM and PPCHM, the total drainage subareas that discharges to Line "B" spans approximately 19.1 acres. Peak flow contributions from street parkway areas that surface drain directly to San Canyon Avenue and Valley Oak Drive are not considered as on-site run-off contributions. The proposed condition estimated subarea peak runoff corresponding to the 2-year, 10-year and 25-year storm event is summarized by Table II below.

TABLE II
PROPOSED CONDITION SUBAREA PEAK RUNOFF

Drainage Sub-Area	Area (Acres)	Q_2 (CFS)	Q_{10} (CFS)	Q_{25} (CFS)	TC_{25} (Minutes)
Subarea A	11.64	12.10	23.53	28.34	7.41
Subarea B	7.45	5.92	11.81	14.46	11.48
Total	**19.09**	**18.02**	**35.34**	**42.80**	**-**

For existing conditions and based on the latest AS-BUILT reference plan for Line "A" provided in Appendix O, a 25-year peak flow of 36.2 CFS is shown captured from the park-site and conveyed by Line "A" to Line "B". The hydraulic grade line (HGL) shown on the profile sheet also indicates that Line "A" is operating under open-channel or non-pressurized flow conditions during peak flow events. Per Appendix N, a 25-year peak flow of 6.4 CFS is shown captured from the park-site and conveyed by Line "C" to Line "B". The hydraulic grade line (HGL) shown on the profile indicates that the downstream portion of Line "C" is operating under pressurized flow conditions during peak flow events. Per the PECHM and Table I above, the existing condition 25-year storm peak flow for subarea A and subarea B is estimated at 26.7 CFS and 15.8 CFS respectively. Per the PPCHM and Table II above, the proposed condition 25-year storm peak flow for subarea A and subarea B is estimated at 28.3 CFS and 14.5 CFS respectively. On-site peak flow contributions to Line "B" from Line "A" and Line "C" are summarized by Table III below.

TABLE III
25-YEAR STORM SUBAREA PEAK RUNOFF CONVEYANCE TO LINE "B"

Source Document	Peak Flow Rate (CFS)			Comments
	Line "A"	Line "C"	Total	
AS-BUILT Plans (Exist. Condition)	36.2	6.4	42.6	Line "A" - Non-pressurized flow Line "C" – Pressurized flow @ DS portion
PECHM (Exist. Condition)	26.74	15.80	42.54	Total existing on-site runoff to Line "B" is similar to AS-BUILT values
PPCHM (Prop. Condition)	28.34	14.46	42.80	Total proposed on-site runoff to Line "B" is similar to AS-BUILT values

Peak flow values between the AS-BUILT plans and the PECHM should be similar since the PECHM is representative of existing site conditions. As anticipated, the total onsite runoff contributions to Line "B" appears to be the same. However, flow distributions to Line "A" and Line "C" are dissimilar. Since it is unclear how the AS-BUILT plan peak flows were generated, PECHM peak flows for Line "A" and Line "C" will be assumed as the baseline condition. In comparison to the PECHM, PPCHM values indicate a slight increase in peak runoff at Line "A" of 1.60 CFS, a slight reduction in peak runoff at Line "C" of about 1.34 CFS, and a slight increase in the overall on-site contributions to Line "B" of about 0.26 CFS. Due to the minute differences in peak flows, no significant changes to Line "A", Line "B" or Line "C" is anticipated for the proposed condition.

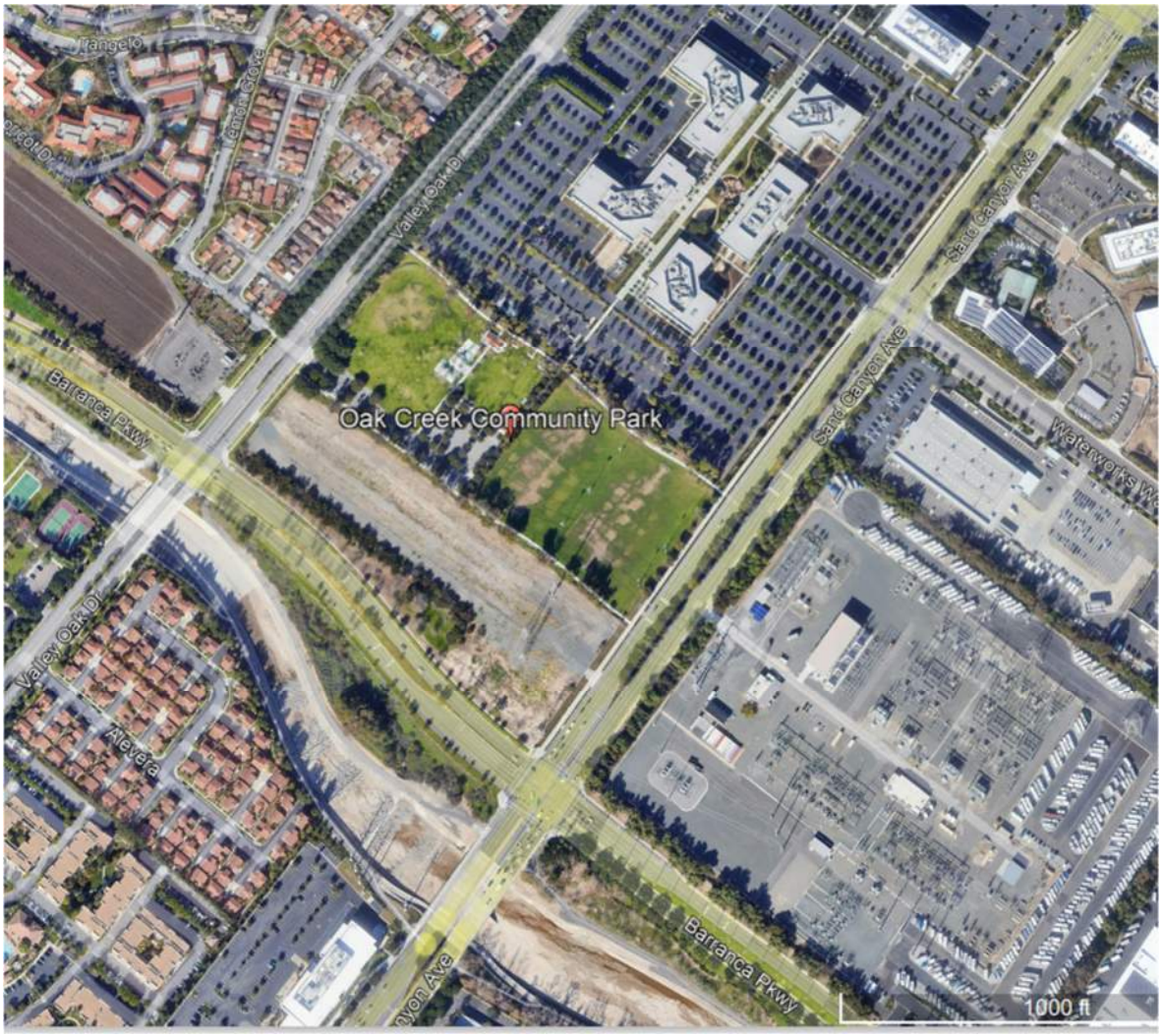
Table IV below provides for peak flow values contributing to Line "B" based on the 2-year storm event. As shown, the total peak flow rate for the proposed condition of about 18.02 CFS is slightly larger than the existing condition peak flow rate of about 17.47 CFS, translating to an overall increase in onsite runoff of about 0.55 CFS.

TABLE IV 2-YEAR STORM SUBAREA PEAK RUNOFF CONVEYANCE TO LINE "B"				
Source Document	**Peak Flow Rate (CFS)**			**Comments**
	Line "A"	**Line "C"**	**Total**	
PECHM (Exist. Condition)	11.51	5.96	17.47	-
PPCHM (Prop. Condition)	12.10	5.92	18.02	-
-	**Difference**		**0.55**	-

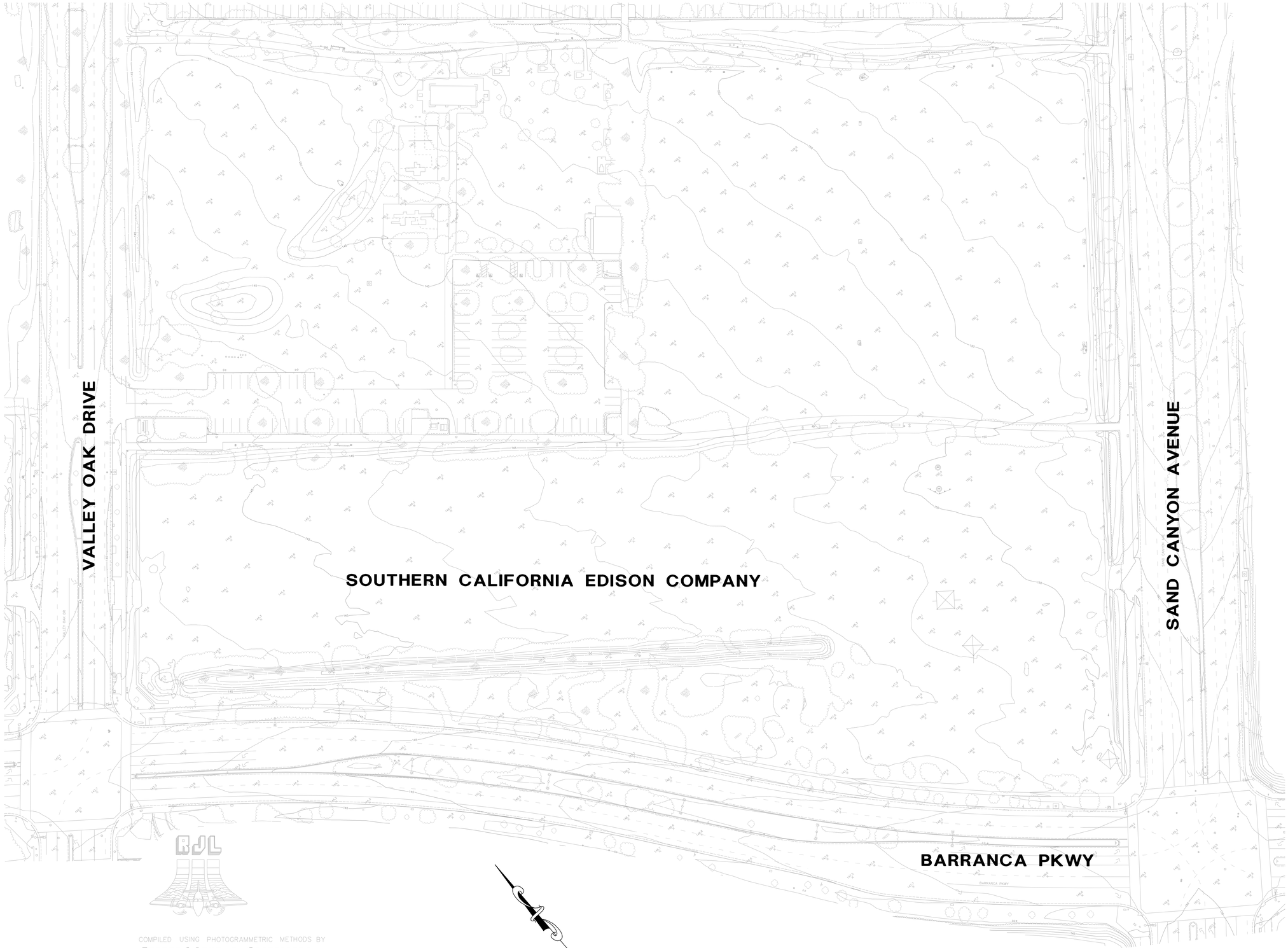
The 0.55 CFS overall increase in onsite peak runoff equates to about a 3.15% increase from the existing condition. Since the increase in onsite peak runoff is less than five percent (5%), hydromodification controls are not anticipated to be required for the project.

END OF SECTION A

Appendix A
Vicinity Map



Appendix B
TOPOGRAPHIC SURVEY MAP



COMPILED USING PHOTOGRAMMETRIC METHODS BY
ROBERT J. LUNG & ASSOCIATES
2832 WALNUT AVENUE, SUITE E
TUSTIN, CALIFORNIA 92680
(714) 832-2077

WORK ORDER: 44133
DATE OF PHOTOGRAPHY: 7/24/19
CONTOUR INTERVAL: 1'

50' 25' 0' 50' 100'
GRAPHIC SCALE: 1"=50'

CITY OF IRVINE
OAK CREEK COMMUNITY PARK

TOPOGRAPHIC SURVEY MAP

JOB NO.:	19-2260
DATE:	03/17/2022
DRAWNED BY:	
DESIGNED BY:	
APPROVED BY:	
SHEET	1 OF 1

Appendix C
NATIONAL FLOOD HAZARD LAYER FIRMETTE

National Flood Hazard Layer FIRMette

FEMA

117°46'35"W 33°40'14"N



117°45'58"W 33°39'44"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

F-13

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/8/2022 at 1:53 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix D
HYDROLOGIC CLASSIFICATION OF SOILS



HYDROLOGIC CLASSIFICATION OF SOILS

ORANGE COUNTY, CALIFORNIA

MAY 1986, PLATE B

Appendix E

Existing Q_2 Hydrology Calculations

```
**************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2008 Advanced Engineering Software (aes)
              Ver. 15.0  Release Date: 04/01/2008  License ID 1204

                              Analysis prepared by:

                          ADAMS STREETER CIVIL ENGINEERS
                        16755 VON KARMAN AVENUE, SUITE 150
                                IRVINE, CA 92606
                                 (949) 474-2330

 ************************** DESCRIPTION OF STUDY **************************
* 2-YEAR STORM EVENT HYDROLOGY ANALYSIS                                   *
* OAKCREEK COMMUNITY PARK, IRVINE CALIFORNIA                              *
* EXISTING CONDITION                                                      *
 **************************************************************************

  FILE NAME: OAK02EXA.DAT
  TIME/DATE OF STUDY: 15:59 04/04/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   251.00
  ELEVATION DATA: UPSTREAM(FEET) =    157.60  DOWNSTREAM(FEET) =    151.80
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.355
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.580
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.07      0.30     0.850    36    9.36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.08
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.08

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  41
----------------------------------------------------------------------------
  ** WARNING: Computed Flowrate is less than 0.1 cfs,
               Routing Algorithm is UNAVAILABLE.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.36
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.580
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.24      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.24      SUBAREA RUNOFF(CFS) =    0.29
  EFFECTIVE AREA(ACRES) =      0.31   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.37

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   363.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   2.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.12
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.37
  PIPE TRAVEL TIME(MIN.) =   1.47    Tc(MIN.) =   10.82
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     614.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.82
```

```
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.453
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.46      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      0.77   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.8       PEAK FLOW RATE(CFS) =       0.83

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.11
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.83
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   11.14
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     711.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.14
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.429
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.11      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.12
  EFFECTIVE AREA(ACRES) =      0.88   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.9       PEAK FLOW RATE(CFS) =       0.93

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.25
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.93
```

```
 PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   11.57
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     846.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.57
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.399
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.77      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.77      SUBAREA RUNOFF(CFS) =    0.79
 EFFECTIVE AREA(ACRES) =      1.65   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        1.6       PEAK FLOW RATE(CFS) =       1.70

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.08
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.70
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.58
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =     851.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.58
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.398
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        3.91      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    3.91      SUBAREA RUNOFF(CFS) =    4.02
 EFFECTIVE AREA(ACRES) =      5.56   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        5.6       PEAK FLOW RATE(CFS) =       5.72

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0111
  FLOW LENGTH(FEET) =   231.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.00
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.72
  PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =   12.22
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1082.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.22
  RAINFALL INTENSITY(INCH/HR) =   1.36
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.85
  EFFECTIVE STREAM AREA(ACRES) =       5.56
  TOTAL STREAM AREA(ACRES) =       5.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.72

****************************************************************************
  FLOW PROCESS FROM NODE      8.10 TO NODE      8.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.00  DOWNSTREAM(FEET) =    144.55

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.542
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.475
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.76      0.30      0.850    36   10.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.83
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      0.83

****************************************************************************
  FLOW PROCESS FROM NODE      8.20 TO NODE      8.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.010
```

```
 DEPTH OF FLOW IN   8.0 INCH PIPE IS   3.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.10
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.83
 PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   11.09
 LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =     467.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.09
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.433
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.60      0.30      0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    0.76
 EFFECTIVE AREA(ACRES) =      1.36   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       1.56

****************************************************************************
 FLOW PROCESS FROM NODE      8.30 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0077
 FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.74
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.56
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   11.25
 LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.00 =     504.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.25
 RAINFALL INTENSITY(INCH/HR) =   1.42
 AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.52
 EFFECTIVE STREAM AREA(ACRES) =       1.36
 TOTAL STREAM AREA(ACRES) =       1.36
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.56

****************************************************************************
```

```
 FLOW PROCESS FROM NODE      8.40 TO NODE      8.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   252.00
 ELEVATION DATA: UPSTREAM(FEET) =    147.00  DOWNSTREAM(FEET) =    142.68

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.261
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.990
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 B        0.44      0.30     0.100    36    6.26
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.78
 TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      0.78

****************************************************************************
 FLOW PROCESS FROM NODE      8.50 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0557
 FLOW LENGTH(FEET) =    37.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.13
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.78
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    6.36
 LONGEST FLOWPATH FROM NODE      8.40 TO NODE      8.00 =     289.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.36
 RAINFALL INTENSITY(INCH/HR) =   1.97
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.44
 TOTAL STREAM AREA(ACRES) =       0.44
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.78

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        5.72   12.22    1.355  0.30( 0.26) 0.85       5.6       1.00
     2        1.56   11.25    1.421  0.30( 0.16) 0.52       1.4       8.10
```

```
    3        0.78    6.36    1.971  0.30( 0.03) 0.10       0.4       8.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        6.69    6.36    1.971  0.30( 0.21) 0.71       4.1       8.40
      2        7.70   11.25    1.421  0.30( 0.22) 0.74       6.9       8.10
      3        7.73   12.22    1.355  0.30( 0.22) 0.74       7.4       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.73    Tc(MIN.) =    12.22
  EFFECTIVE AREA(ACRES) =       7.36   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
  TOTAL AREA(ACRES) =        7.4
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1082.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =   261.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.85
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.73
  PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =   13.12
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1343.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.12
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.301
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.52      0.30     0.100    36
  PUBLIC PARK                B        3.04      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.740
  SUBAREA AREA(ACRES) =    3.56      SUBAREA RUNOFF(CFS) =    3.46
  EFFECTIVE AREA(ACRES) =     10.92   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
  TOTAL AREA(ACRES) =       10.9       PEAK FLOW RATE(CFS) =      10.60

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       11.08    7.29    1.823  0.30( 0.22) 0.72       7.7       8.40
```

```
      2       10.74   12.15    1.360  0.30( 0.22) 0.74      10.5       8.10
      3       10.60   13.12    1.301  0.30( 0.22) 0.74      10.9       1.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      11.08  Tc(MIN.) =    7.29
  AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.72  EFFECTIVE AREA(ACRES) =       7.66

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.29
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.823
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.31      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.31      SUBAREA RUNOFF(CFS) =    0.44
  EFFECTIVE AREA(ACRES) =      7.97   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.73
  TOTAL AREA(ACRES) =       11.2       PEAK FLOW RATE(CFS) =      11.51

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.31
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.51
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    7.43
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    1388.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    43.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.80
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.51
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    7.54
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     11.00 =    1431.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  41
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    93.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.80
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.51
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    7.77
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =    1525.60 FEET.
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =     2.35
 ELEVATION DATA: UPSTREAM(FEET) =    154.00  DOWNSTREAM(FEET) =    149.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.264
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL POOR COVER
 "BARREN"                   B        0.63      0.30     1.000    72    5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.11
 TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      1.11

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    149.00  DOWNSTREAM(FEET) =    139.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   858.00   CHANNEL SLOPE =  0.0106
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.11
 FLOW VELOCITY(FEET/SEC) =   1.58 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   9.07   Tc(MIN.) =   14.07
 LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =     860.35 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.07
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.250
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "BARREN"                   B        4.59      0.30     1.000    72
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    4.59      SUBAREA RUNOFF(CFS) =    3.92
 EFFECTIVE AREA(ACRES) =      5.22   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =       4.46

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.07
  RAINFALL INTENSITY(INCH/HR) =   1.25
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       5.22
  TOTAL STREAM AREA(ACRES) =       5.22
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.46

********************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     23.20 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   285.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.80  DOWNSTREAM(FEET) =    147.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.521
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.337
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                    B        0.84      0.30     1.000    72   12.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.78
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      0.78

********************************************************************************
  FLOW PROCESS FROM NODE     23.20 TO NODE     23.00 IS CODE =  52
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    147.80  DOWNSTREAM(FEET) =    139.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   791.00   CHANNEL SLOPE =  0.0100
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.78
  FLOW VELOCITY(FEET/SEC) =   1.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.79   Tc(MIN.) =   21.32
  LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1076.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   21.32
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.985
  SUBAREA LOSS RATE DATA(AMC  I ):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                     B        1.81      0.30      1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    1.12
  EFFECTIVE AREA(ACRES) =      2.65   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       1.63

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   21.32
  RAINFALL INTENSITY(INCH/HR) =   0.98
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       2.65
  TOTAL STREAM AREA(ACRES) =       2.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.63

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        4.46   14.07    1.250  0.30( 0.30) 1.00       5.2      21.00
      2        1.63   21.32    0.985  0.30( 0.30) 1.00       2.6      23.10

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.96   14.07    1.250  0.30( 0.30) 1.00       7.0      21.00
      2        4.85   21.32    0.985  0.30( 0.30) 1.00       7.9      23.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.96    Tc(MIN.) =    14.07
  EFFECTIVE AREA(ACRES) =       6.97   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.9
  LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1076.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
```

```
  FLOW LENGTH(FEET) =    45.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.89
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.96
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   14.20
  LONGEST FLOWPATH FROM NODE     23.10 TO NODE     24.00 =    1121.70 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        7.9  TC(MIN.) =     14.20
  EFFECTIVE AREA(ACRES) =      6.97  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       5.96

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.96   14.20    1.243  0.30( 0.30) 1.00       7.0      21.00
      2        4.85   21.45    0.981  0.30( 0.30) 1.00       7.9      23.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Appendix F

Existing Q_{10} Hydrology Calculations

```
**************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2008 Advanced Engineering Software (aes)
              Ver. 15.0  Release Date: 04/01/2008  License ID 1204

                              Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* 10-YEAR STORM EVENT HYDROLOGY ANALYSIS                                  *
* OAKCREEK COMMUNITY PARK, IRVINE CALIFORNIA                              *
* EXISTING CONDITION                                                      *
 **************************************************************************

  FILE NAME: OAK10EXA.DAT
  TIME/DATE OF STUDY: 16:11 04/04/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   251.00
  ELEVATION DATA: UPSTREAM(FEET) =    157.60  DOWNSTREAM(FEET) =    151.80
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.355
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.835
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.07      0.30     0.850    56    9.36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =    49.40   MANNING'S N =  0.010
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.35
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.16
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =    9.60
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     300.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.60
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.793
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.24      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.24      SUBAREA RUNOFF(CFS) =    0.55
  EFFECTIVE AREA(ACRES) =      0.31   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.71

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   363.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   3.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.91
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.71
```

```
 PIPE TRAVEL TIME(MIN.) =   1.23    Tc(MIN.) =   10.83
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     663.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.83
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.607
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.46      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    0.97
 EFFECTIVE AREA(ACRES) =      0.77   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        0.8       PEAK FLOW RATE(CFS) =       1.63

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN   8.0 INCH PIPE IS   5.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.92
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.63
 PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   11.11
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     760.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.11
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.570
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.11      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.23
 EFFECTIVE AREA(ACRES) =      0.88   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        0.9       PEAK FLOW RATE(CFS) =       1.83

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.25
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.83
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   11.53
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     895.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   11.53
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.515
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.77      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.77      SUBAREA RUNOFF(CFS) =    1.57
  EFFECTIVE AREA(ACRES) =      1.65   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        1.6       PEAK FLOW RATE(CFS) =       3.36

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.22
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.36
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.55
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =     900.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   11.55
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.513
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        3.91      0.30     0.850    56
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.91      SUBAREA RUNOFF(CFS) =    7.95
  EFFECTIVE AREA(ACRES) =      5.56   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        5.6       PEAK FLOW RATE(CFS) =      11.30

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0111
  FLOW LENGTH(FEET) =   231.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.20
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.30
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   12.08
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1131.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.08
  RAINFALL INTENSITY(INCH/HR) =   2.45
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.85
  EFFECTIVE STREAM AREA(ACRES) =       5.56
  TOTAL STREAM AREA(ACRES) =       5.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.30

****************************************************************************
  FLOW PROCESS FROM NODE      8.10 TO NODE      8.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.00  DOWNSTREAM(FEET) =    144.55

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.542
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.648
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.76      0.30     0.850    56   10.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      1.64
```

```
 TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      1.64

****************************************************************************
 FLOW PROCESS FROM NODE      8.20 TO NODE      8.30 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN   8.0 INCH PIPE IS   5.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.92
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.64
 PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   11.01
 LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =     467.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.01
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.582
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.60      0.30     0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    1.38
 EFFECTIVE AREA(ACRES) =      1.36   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       2.97

****************************************************************************
 FLOW PROCESS FROM NODE      8.30 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0077
 FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.47
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.97
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   11.15
 LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.00 =     504.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
```

```
  TIME OF CONCENTRATION(MIN.) =   11.15
  RAINFALL INTENSITY(INCH/HR) =   2.56
  AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.52
  EFFECTIVE STREAM AREA(ACRES) =       1.36
  TOTAL STREAM AREA(ACRES) =       1.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.97

****************************************************************************
  FLOW PROCESS FROM NODE      8.40 TO NODE      8.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   252.00
  ELEVATION DATA: UPSTREAM(FEET) =    147.00  DOWNSTREAM(FEET) =    142.68

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.261
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.569
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.44      0.30     0.100    56    6.26
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.40
  TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      1.40

****************************************************************************
  FLOW PROCESS FROM NODE      8.50 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0557
  FLOW LENGTH(FEET) =    37.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.31
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.40
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    6.35
  LONGEST FLOWPATH FROM NODE      8.40 TO NODE      8.00 =     289.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.35
  RAINFALL INTENSITY(INCH/HR) =   3.54
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
```

```
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.44
 TOTAL STREAM AREA(ACRES) =       0.44
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.40

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       11.30   12.08    2.449  0.30( 0.26) 0.85       5.6       1.00
     2        2.97   11.15    2.564  0.30( 0.16) 0.52       1.4       8.10
     3        1.40    6.35    3.541  0.30( 0.03) 0.10       0.4       8.40

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       12.67    6.35    3.541  0.30( 0.21) 0.71       4.1       8.40
     2       14.96   11.15    2.564  0.30( 0.22) 0.74       6.9       8.10
     3       15.09   12.08    2.449  0.30( 0.22) 0.74       7.4       1.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      15.09    Tc(MIN.) =    12.08
 EFFECTIVE AREA(ACRES) =       7.36   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
 TOTAL AREA(ACRES) =        7.4
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1131.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =   261.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.51
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.09
 PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   12.87
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1392.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.87
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.362
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.52      0.30     0.100    56
 PUBLIC PARK                B        3.04      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.740
  SUBAREA AREA(ACRES) =    3.56      SUBAREA RUNOFF(CFS) =    6.85
  EFFECTIVE AREA(ACRES) =     10.92   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
  TOTAL AREA(ACRES) =       10.9       PEAK FLOW RATE(CFS) =      21.02

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       21.40    7.15    3.307  0.30( 0.22) 0.72       7.7       8.40
      2       21.19   11.94    2.465  0.30( 0.22) 0.74      10.5       8.10
      3       21.02   12.87    2.362  0.30( 0.22) 0.74      10.9       1.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      21.40  Tc(MIN.) =    7.15
  AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.72  EFFECTIVE AREA(ACRES) =       7.70

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.15
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.307
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               B        0.31      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.31      SUBAREA RUNOFF(CFS) =    0.85
  EFFECTIVE AREA(ACRES) =      8.01   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.73
  TOTAL AREA(ACRES) =       11.2       PEAK FLOW RATE(CFS) =      22.25

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.08
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.25
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    7.26
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    1437.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    43.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  14.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.17
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.25
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    7.35
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     11.00 =    1481.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    93.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  14.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.17
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.25
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    7.54
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =    1575.00 FEET.
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =     2.35
  ELEVATION DATA: UPSTREAM(FEET) =    154.00  DOWNSTREAM(FEET) =    149.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.060
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                    B        0.63      0.30     1.000    86    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.13
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      2.13

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    149.00  DOWNSTREAM(FEET) =    139.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   858.00   CHANNEL SLOPE =  0.0106
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.13
  FLOW VELOCITY(FEET/SEC) =   1.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.96   Tc(MIN.) =   12.96
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =     860.35 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.96
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.352
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                    B        4.59      0.30     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.59      SUBAREA RUNOFF(CFS) =    8.48
  EFFECTIVE AREA(ACRES) =      5.22   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =       9.64

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.96
  RAINFALL INTENSITY(INCH/HR) =   2.35
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       5.22
  TOTAL STREAM AREA(ACRES) =       5.22
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.64

******************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     23.20 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   285.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.80  DOWNSTREAM(FEET) =    147.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.521
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.399
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        0.84      0.30     1.000    86   12.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.59
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      1.59

******************************************************************************
  FLOW PROCESS FROM NODE     23.20 TO NODE     23.00 IS CODE =  52
------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    147.80  DOWNSTREAM(FEET) =    139.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   791.00   CHANNEL SLOPE =  0.0100
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.59
  FLOW VELOCITY(FEET/SEC) =   1.64 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.04   Tc(MIN.) =   20.56
  LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1076.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   20.56
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.806
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "BARREN"                  B        1.81      0.30      1.000    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    2.45
 EFFECTIVE AREA(ACRES) =      2.65   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       3.59

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   20.56
 RAINFALL INTENSITY(INCH/HR) =   1.81
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       2.65
 TOTAL STREAM AREA(ACRES) =       2.65
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.59

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        9.64   12.96    2.352  0.30( 0.30) 1.00       5.2      21.00
     2        3.59   20.56    1.806  0.30( 0.30) 1.00       2.6      23.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       12.73   12.96    2.352  0.30( 0.30) 1.00       6.9      21.00
     2       10.66   20.56    1.806  0.30( 0.30) 1.00       7.9      23.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      12.73    Tc(MIN.) =    12.96
 EFFECTIVE AREA(ACRES) =       6.89   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        7.9
 LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1076.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    45.70   MANNING'S N =  0.013
```

```
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.20
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.73
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   13.07
  LONGEST FLOWPATH FROM NODE     23.10 TO NODE     24.00 =    1121.70 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        7.9  TC(MIN.) =     13.07
  EFFECTIVE AREA(ACRES) =      6.89  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =      12.73

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       12.73   13.07    2.341  0.30( 0.30) 1.00       6.9      21.00
      2       10.66   20.69    1.799  0.30( 0.30) 1.00       7.9      23.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Appendix G

Existing Q_{25} Hydrology Calculations

```
**************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2008 Advanced Engineering Software (aes)
              Ver. 15.0  Release Date: 04/01/2008  License ID 1204

                              Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* 25-YEAR STORM EVENT HYDROLOGY ANALYSIS                                  *
* OAKCREEK COMMUNITY PARK, IRVINE CALIFORNIA                              *
* EXISTING CONDITION                                                      *
 **************************************************************************

  FILE NAME: OAK25EXA.DAT
  TIME/DATE OF STUDY: 16:19 04/04/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   251.00
  ELEVATION DATA: UPSTREAM(FEET) =    157.60  DOWNSTREAM(FEET) =    151.80
```

```
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.355
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.384
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 PUBLIC PARK                B        0.07      0.30     0.850    56    9.36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA RUNOFF(CFS) =      0.20
 TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.20

****************************************************************************
 FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =    49.40   MANNING'S N =  0.010
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.51
 GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.20
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    9.59
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     300.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.59
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.336
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.24      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.24      SUBAREA RUNOFF(CFS) =    0.67
 EFFECTIVE AREA(ACRES) =      0.31   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.86

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =   363.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN   8.0 INCH PIPE IS   3.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.13
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.86
```

```
 PIPE TRAVEL TIME(MIN.) =   1.18    Tc(MIN.) =   10.77
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     663.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.77
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.125
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.46      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.46      SUBAREA RUNOFF(CFS) =    1.19
 EFFECTIVE AREA(ACRES) =      0.77   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        0.8       PEAK FLOW RATE(CFS) =       1.99

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.010
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.70
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.99
 PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   11.05
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     760.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.05
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.079
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.11      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.28
 EFFECTIVE AREA(ACRES) =      0.88   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        0.9       PEAK FLOW RATE(CFS) =       2.24

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  41
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.41
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.24
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   11.40
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     895.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.40
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.025
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.77      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.77      SUBAREA RUNOFF(CFS) =    1.92
  EFFECTIVE AREA(ACRES) =      1.65   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        1.6       PEAK FLOW RATE(CFS) =       4.11

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.54
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.11
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.41
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =     900.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.41
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.023
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  PUBLIC PARK                B        3.91      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.91      SUBAREA RUNOFF(CFS) =    9.74
  EFFECTIVE AREA(ACRES) =      5.56   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        5.6       PEAK FLOW RATE(CFS) =      13.85

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0111
  FLOW LENGTH(FEET) =   231.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  13.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.56
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.85
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   11.92
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1131.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.92
  RAINFALL INTENSITY(INCH/HR) =   2.95
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.85
  EFFECTIVE STREAM AREA(ACRES) =       5.56
  TOTAL STREAM AREA(ACRES) =       5.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.85

****************************************************************************
  FLOW PROCESS FROM NODE      8.10 TO NODE      8.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.00  DOWNSTREAM(FEET) =    144.55

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.542
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.162
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.76      0.30     0.850    56   10.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
```

```
  SUBAREA RUNOFF(CFS) =      1.99
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      1.99

****************************************************************************
  FLOW PROCESS FROM NODE      8.20 TO NODE      8.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.70
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.99
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   11.03
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =     467.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.03
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.082
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.60      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    1.65
  EFFECTIVE AREA(ACRES) =      1.36   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       3.58

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0077
  FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.71
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.58
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   11.16
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.00 =     504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.16
 RAINFALL INTENSITY(INCH/HR) =   3.06
 AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.52
 EFFECTIVE STREAM AREA(ACRES) =       1.36
 TOTAL STREAM AREA(ACRES) =       1.36
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.58

****************************************************************************
 FLOW PROCESS FROM NODE      8.40 TO NODE      8.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   252.00
 ELEVATION DATA: UPSTREAM(FEET) =    147.00  DOWNSTREAM(FEET) =    142.68

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.261
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.247
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 B        0.44      0.30      0.100    56    6.26
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.67
 TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      1.67

****************************************************************************
 FLOW PROCESS FROM NODE      8.50 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0557
 FLOW LENGTH(FEET) =    37.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.68
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.67
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    6.34
 LONGEST FLOWPATH FROM NODE      8.40 TO NODE      8.00 =     289.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.34
 RAINFALL INTENSITY(INCH/HR) =   4.22
```

```
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.44
 TOTAL STREAM AREA(ACRES) =       0.44
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.67

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       13.85   11.92    2.949  0.30( 0.26) 0.85       5.6       1.00
     2        3.58   11.16    3.062  0.30( 0.16) 0.52       1.4       8.10
     3        1.67    6.34    4.216  0.30( 0.03) 0.10       0.4       8.40

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       15.35    6.34    4.216  0.30( 0.21) 0.71       4.2       8.40
     2       18.30   11.16    3.062  0.30( 0.22) 0.74       7.0       8.10
     3       18.46   11.92    2.949  0.30( 0.22) 0.74       7.4       1.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      18.46    Tc(MIN.) =    11.92
 EFFECTIVE AREA(ACRES) =       7.36   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
 TOTAL AREA(ACRES) =        7.4
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1131.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =   261.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.88
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      18.46
 PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   12.66
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1392.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.66
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.851
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
 COMMERCIAL                 B        0.52      0.30     0.100    56
 PUBLIC PARK                B        3.04      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.740
 SUBAREA AREA(ACRES) =    3.56      SUBAREA RUNOFF(CFS) =    8.42
 EFFECTIVE AREA(ACRES) =     10.92   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
 TOTAL AREA(ACRES) =       10.9       PEAK FLOW RATE(CFS) =      25.83

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       25.72    7.23    3.914  0.30( 0.22) 0.72       7.7       8.40
     2       25.96   11.91    2.952  0.30( 0.22) 0.74      10.6       8.10
     3       25.83   12.66    2.851  0.30( 0.22) 0.74      10.9       1.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      25.96  Tc(MIN.) =   11.91
 AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.74  EFFECTIVE AREA(ACRES) =      10.56

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.91
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.952
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.31      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.31      SUBAREA RUNOFF(CFS) =    0.75
 EFFECTIVE AREA(ACRES) =     10.87   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
 TOTAL AREA(ACRES) =       11.2       PEAK FLOW RATE(CFS) =      26.71

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       26.74    7.23    3.914  0.30( 0.22) 0.73       8.0       8.40
     2       26.71   11.91    2.952  0.30( 0.22) 0.74      10.9       8.10
     3       26.55   12.66    2.851  0.30( 0.22) 0.75      11.2       1.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      26.74  Tc(MIN.) =    7.23
 AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.73  EFFECTIVE AREA(ACRES) =       8.04

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
```

```
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.51
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.74
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    7.32
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    1437.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    43.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  16.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.58
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.74
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.41
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     11.00 =    1481.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    93.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  16.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.58
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.74
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    7.59
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =    1575.00 FEET.
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =     2.35
  ELEVATION DATA: UPSTREAM(FEET) =    154.00  DOWNSTREAM(FEET) =    149.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.824
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                    B        0.63      0.30     1.000    86    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.56
  TOTAL AREA(ACRES) =      0.63   PEAK FLOW RATE(CFS) =      2.56

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    149.00  DOWNSTREAM(FEET) =    139.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   858.00   CHANNEL SLOPE =  0.0106
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.56
  FLOW VELOCITY(FEET/SEC) =   1.87 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.65   Tc(MIN.) =   12.65
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =     860.35 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.65
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.852
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                    B        4.59      0.30     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.59      SUBAREA RUNOFF(CFS) =   10.54
  EFFECTIVE AREA(ACRES) =      5.22   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =      11.99

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.65
  RAINFALL INTENSITY(INCH/HR) =   2.85
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       5.22
  TOTAL STREAM AREA(ACRES) =       5.22
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.99

******************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     23.20 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   285.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.80  DOWNSTREAM(FEET) =    147.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.521
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.869
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        0.84      0.30     1.000    86   12.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.94
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      1.94

******************************************************************************
  FLOW PROCESS FROM NODE     23.20 TO NODE     23.00 IS CODE =  52
------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    147.80  DOWNSTREAM(FEET) =    139.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   791.00   CHANNEL SLOPE =  0.0100
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.94
  FLOW VELOCITY(FEET/SEC) =   1.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.71   Tc(MIN.) =   20.23
  LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1076.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   20.23
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.187
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "BARREN"                  B        1.81      0.30      1.000    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    3.07
 EFFECTIVE AREA(ACRES) =      2.65   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       4.50

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   20.23
 RAINFALL INTENSITY(INCH/HR) =   2.19
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       2.65
 TOTAL STREAM AREA(ACRES) =       2.65
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.50

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       11.99   12.65    2.852  0.30( 0.30) 1.00       5.2      21.00
     2        4.50   20.23    2.187  0.30( 0.30) 1.00       2.6      23.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       15.80   12.65    2.852  0.30( 0.30) 1.00       6.9      21.00
     2       13.36   20.23    2.187  0.30( 0.30) 1.00       7.9      23.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      15.80    Tc(MIN.) =    12.65
 EFFECTIVE AREA(ACRES) =       6.88   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        7.9
 LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1076.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    45.70   MANNING'S N =  0.013
```

```
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.94
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.80
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   12.74
  LONGEST FLOWPATH FROM NODE     23.10 TO NODE     24.00 =    1121.70 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        7.9  TC(MIN.) =     12.74
  EFFECTIVE AREA(ACRES) =      6.88  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =      15.80

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       15.80   12.74    2.841  0.30( 0.30) 1.00       6.9      21.00
      2       13.36   20.33    2.180  0.30( 0.30) 1.00       7.9      23.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Appendix H

Proposed Q_2 Hydrology Calculations

```
**************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2008 Advanced Engineering Software (aes)
              Ver. 15.0  Release Date: 04/01/2008  License ID 1204

                              Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* 2-YEAR STORM EVENT HYDROLOGY ANYLYSIS                                  *
* OAKCREEK COMMUNITY PARK, IRVINE CALIFORNIA                             *
* PROPOSED CONDITION                                                     *
 **************************************************************************

  FILE NAME: OAK02PRA.DAT
  TIME/DATE OF STUDY: 16:01 04/04/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   251.00
  ELEVATION DATA: UPSTREAM(FEET) =    157.00  DOWNSTREAM(FEET) =    151.80
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.562
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.560
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.07      0.30     0.850    36    9.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.08
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.08

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  41
----------------------------------------------------------------------------
  ** WARNING: Computed Flowrate is less than 0.1 cfs,
               Routing Algorithm is UNAVAILABLE.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.56
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.560
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.24      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.24      SUBAREA RUNOFF(CFS) =    0.28
  EFFECTIVE AREA(ACRES) =      0.31   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.36

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   363.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   2.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.06
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.36
  PIPE TRAVEL TIME(MIN.) =   1.49    Tc(MIN.) =   11.05
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     614.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.05
```

```
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.436
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               B        2.53      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    2.53      SUBAREA RUNOFF(CFS) =    2.69
  EFFECTIVE AREA(ACRES) =      2.84   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       3.02

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.65
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.02
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.24
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     711.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.24
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.422
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               B        0.25      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.26
  EFFECTIVE AREA(ACRES) =      3.09   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       3.25

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.30
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
```

```
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.25
 PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   11.48
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     846.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.48
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.405
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.71      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.71      SUBAREA RUNOFF(CFS) =    0.73
 EFFECTIVE AREA(ACRES) =      3.80   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =       3.93

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.48
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.93
 PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.49
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =     851.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.49
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.404
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        2.01      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    2.01      SUBAREA RUNOFF(CFS) =    2.08
 EFFECTIVE AREA(ACRES) =      5.81   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =       6.01

****************************************************************************
```

```
 FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0111
 FLOW LENGTH(FEET) =   231.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.08
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.01
 PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =   12.12
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1082.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.12
 RAINFALL INTENSITY(INCH/HR) =   1.36
 AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.85
 EFFECTIVE STREAM AREA(ACRES) =       5.81
 TOTAL STREAM AREA(ACRES) =       5.81
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.01

****************************************************************************
 FLOW PROCESS FROM NODE      8.10 TO NODE      8.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =    150.00  DOWNSTREAM(FEET) =    144.55

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.542
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.475
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 PUBLIC PARK                B        0.76      0.30     0.850    36   10.54
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA RUNOFF(CFS) =      0.83
 TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      0.83

****************************************************************************
 FLOW PROCESS FROM NODE      8.20 TO NODE      8.30 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.010
 DEPTH OF FLOW IN   8.0 INCH PIPE IS   3.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.10
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.83
 PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   11.09
 LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =     467.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.09
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.433
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.51      0.30     0.100    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.51      SUBAREA RUNOFF(CFS) =    0.64
 EFFECTIVE AREA(ACRES) =      1.27   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.55
 TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       1.45

****************************************************************************
 FLOW PROCESS FROM NODE      8.30 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0077
 FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.66
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.45
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   11.26
 LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.00 =     504.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.26
 RAINFALL INTENSITY(INCH/HR) =   1.42
 AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.55
 EFFECTIVE STREAM AREA(ACRES) =       1.27
 TOTAL STREAM AREA(ACRES) =       1.27
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.45
```

```
****************************************************************************
 FLOW PROCESS FROM NODE      8.40 TO NODE      8.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   255.00
 ELEVATION DATA: UPSTREAM(FEET) =    147.00  DOWNSTREAM(FEET) =    142.68

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.305
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.982
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 B        0.45      0.30      0.100    36    6.31
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.79
 TOTAL AREA(ACRES) =      0.45   PEAK FLOW RATE(CFS) =      0.79

****************************************************************************
 FLOW PROCESS FROM NODE      8.50 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0557
 FLOW LENGTH(FEET) =    37.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.14
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.79
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    6.41
 LONGEST FLOWPATH FROM NODE      8.40 TO NODE      8.00 =     292.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.41
 RAINFALL INTENSITY(INCH/HR) =   1.96
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.45
 TOTAL STREAM AREA(ACRES) =       0.45
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.79

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
```

```
    1        6.01   12.12    1.361  0.30( 0.26) 0.85       5.8       1.00
    2        1.45   11.26    1.421  0.30( 0.16) 0.55       1.3       8.10
    3        0.79    6.41    1.963  0.30( 0.03) 0.10       0.4       8.40

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        6.87    6.41    1.963  0.30( 0.22) 0.72       4.2       8.40
      2        7.90   11.26    1.421  0.30( 0.22) 0.75       7.1       8.10
      3        7.93   12.12    1.361  0.30( 0.23) 0.75       7.5       1.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.93    Tc(MIN.) =    12.12
  EFFECTIVE AREA(ACRES) =       7.53   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =        7.5
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1082.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =   261.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.88
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.93
  PIPE TRAVEL TIME(MIN.) =   0.89    Tc(MIN.) =   13.01
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1343.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.01
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.307
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.50      0.30      0.100    36
  PUBLIC PARK                B        3.13      0.30      0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.747
  SUBAREA AREA(ACRES) =    3.63      SUBAREA RUNOFF(CFS) =    3.54
  EFFECTIVE AREA(ACRES) =     11.16   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =       11.2       PEAK FLOW RATE(CFS) =      10.86

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1       11.32    7.33    1.817  0.30( 0.22) 0.73       7.9       8.40
    2       10.98   12.15    1.360  0.30( 0.22) 0.75      10.7       8.10
    3       10.86   13.01    1.307  0.30( 0.23) 0.75      11.2       1.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      11.32  Tc(MIN.) =    7.33
 AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.73  EFFECTIVE AREA(ACRES) =       7.87

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.33
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.817
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.33      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    0.46
 EFFECTIVE AREA(ACRES) =      8.20   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
 TOTAL AREA(ACRES) =       11.5       PEAK FLOW RATE(CFS) =      11.79

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.33
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.817
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.22      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.31
 EFFECTIVE AREA(ACRES) =      8.42   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
 TOTAL AREA(ACRES) =       11.7       PEAK FLOW RATE(CFS) =      12.10

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.36
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.10
```

```
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    7.47
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    1388.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    43.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.90
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.10
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    7.58
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     11.00 =    1431.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    93.90   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  10.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.90
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.10
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    7.80
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =    1525.60 FEET.
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   314.00
 ELEVATION DATA: UPSTREAM(FEET) =    154.00  DOWNSTREAM(FEET) =    148.60

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.799
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.383
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL POOR COVER
 "BARREN"                   B        0.88      0.30     1.000    72   11.80
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.86
 TOTAL AREA(ACRES) =      0.88   PEAK FLOW RATE(CFS) =      0.86

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.50 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    148.60  DOWNSTREAM(FEET) =    143.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   472.00   CHANNEL SLOPE =  0.0100
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.86
 FLOW VELOCITY(FEET/SEC) =   1.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   5.26   Tc(MIN.) =   17.05
 LONGEST FLOWPATH FROM NODE     21.00 TO NODE     22.50 =     786.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.05
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.119
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.48      0.30     0.850    36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.48      SUBAREA RUNOFF(CFS) =    0.37
 EFFECTIVE AREA(ACRES) =      1.36   AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.95
 TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       1.02

****************************************************************************
 FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.05
  RAINFALL INTENSITY(INCH/HR) =   1.12
  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.95
  EFFECTIVE STREAM AREA(ACRES) =       1.36
  TOTAL STREAM AREA(ACRES) =       1.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.02

******************************************************************************
  FLOW PROCESS FROM NODE     22.51 TO NODE     22.52 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   283.30
  ELEVATION DATA: UPSTREAM(FEET) =    150.40  DOWNSTREAM(FEET) =    147.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.224
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.833
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.71      0.30     0.100    36    7.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.15
  TOTAL AREA(ACRES) =      0.71   PEAK FLOW RATE(CFS) =      1.15

******************************************************************************
  FLOW PROCESS FROM NODE     22.52 TO NODE     22.53 IS CODE =  61
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
==============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  STREET LENGTH(FEET) =   220.70   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.73
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.90
```

```
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.58
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
  STREET FLOW TRAVEL TIME(MIN.) =   2.33   Tc(MIN.) =    9.56
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.561
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.84      0.30     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    1.16
  EFFECTIVE AREA(ACRES) =      1.55    AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       2.14

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.82
  FLOW VELOCITY(FEET/SEC.) =  1.66   DEPTH*VELOCITY(FT*FT/SEC.) =   0.57
  LONGEST FLOWPATH FROM NODE     22.51 TO NODE     22.53 =     504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.53 TO NODE     22.53 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.56
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.561
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.15      0.30     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.21
  EFFECTIVE AREA(ACRES) =      1.70   AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       2.34

****************************************************************************
  FLOW PROCESS FROM NODE     22.53 TO NODE     22.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.64
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.34
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    9.74
  LONGEST FLOWPATH FROM NODE     22.51 TO NODE     22.50 =     554.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.74
  RAINFALL INTENSITY(INCH/HR) =   1.54
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.70
  TOTAL STREAM AREA(ACRES) =       1.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.34

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.02   17.05    1.119  0.30( 0.28) 0.95       1.4      21.00
      2        2.34    9.74    1.544  0.30( 0.03) 0.10       1.7      22.51

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        3.22    9.74    1.544  0.30( 0.11) 0.37       2.5      22.51
      2        2.71   17.05    1.119  0.30( 0.14) 0.48       3.1      21.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.22    Tc(MIN.) =     9.74
  EFFECTIVE AREA(ACRES) =       2.48   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =        3.1
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     22.50 =     786.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    143.90  DOWNSTREAM(FEET) =    139.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   325.40   CHANNEL SLOPE =  0.0126
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.22
  FLOW VELOCITY(FEET/SEC) =   2.14 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.53   Tc(MIN.) =   12.27
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =    1111.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.27
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.352
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)   (INCH/HR)   (DECIMAL)   CN
  PUBLIC PARK              B        0.25       0.30       0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.25
  EFFECTIVE AREA(ACRES) =      2.73   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =       3.22
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.27
  RAINFALL INTENSITY(INCH/HR) =   1.35
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.41
  EFFECTIVE STREAM AREA(ACRES) =       2.73
  TOTAL STREAM AREA(ACRES) =       3.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.22

****************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     23.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   285.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.80  DOWNSTREAM(FEET) =    147.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.521
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.337
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)   (INCH/HR)   (DECIMAL)   CN   (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        0.84       0.30       1.000    72   12.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.78
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      0.78

****************************************************************************
  FLOW PROCESS FROM NODE     23.20 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    147.80  DOWNSTREAM(FEET) =    139.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   815.80   CHANNEL SLOPE =  0.0101
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
```

```
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.78
 FLOW VELOCITY(FEET/SEC) =   1.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   9.04   Tc(MIN.) =   21.56
 LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1100.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   21.56
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.978
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "BARREN"                    B        1.81      0.30     1.000    72
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    1.11
 EFFECTIVE AREA(ACRES) =      2.65   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       1.62

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   21.56
 RAINFALL INTENSITY(INCH/HR) =   0.98
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       2.65
 TOTAL STREAM AREA(ACRES) =       2.65
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.62

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        3.22   12.27    1.352  0.30( 0.12) 0.41       2.7      22.51
     1        2.71   19.69    1.031  0.30( 0.15) 0.50       3.3      21.00
     2        1.62   21.56    0.978  0.30( 0.30) 1.00       2.6      23.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        4.65   12.27    1.352  0.30( 0.19) 0.62       4.2      22.51
     2        4.30   19.69    1.031  0.30( 0.21) 0.71       5.7      21.00
     3        4.16   21.56    0.978  0.30( 0.22) 0.72       6.0      23.10
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.65    Tc(MIN.) =    12.27
  EFFECTIVE AREA(ACRES) =       4.23   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.62
  TOTAL AREA(ACRES) =        6.0
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =    1111.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.27
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.352
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        1.49      0.30     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    1.49      SUBAREA RUNOFF(CFS) =    1.47
  EFFECTIVE AREA(ACRES) =      5.72   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =        7.4       PEAK FLOW RATE(CFS) =       5.92

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    45.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.88
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.92
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   12.40
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     24.00 =    1157.10 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        7.4  TC(MIN.) =     12.40
  EFFECTIVE AREA(ACRES) =      5.72  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.680
  PEAK FLOW RATE(CFS)   =       5.92

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1        5.92   12.40    1.344  0.30( 0.20) 0.68        5.7       22.51
      2        5.25   19.82    1.027  0.30( 0.22) 0.74        7.2       21.00
      3        5.05   21.70    0.975  0.30( 0.22) 0.75        7.4       23.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Appendix I

Proposed Q_{10} Hydrology Calculations

```
**************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2008 Advanced Engineering Software (aes)
              Ver. 15.0  Release Date: 04/01/2008  License ID 1204

                              Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* 10-YEAR STORM EVENT HYDROLOGY ANALYSIS                                  *
* OAKCREEK COMMUNITY PARK, IRVINE CALIFORNIA                              *
* PROPOSED CONDITION                                                      *
 **************************************************************************

  FILE NAME: OAK10PRA.DAT
  TIME/DATE OF STUDY: 16:13 04/04/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   251.00
  ELEVATION DATA: UPSTREAM(FEET) =    157.00  DOWNSTREAM(FEET) =    151.80
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.562
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.800
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.07      0.30     0.850    56    9.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =    49.40   MANNING'S N =  0.010
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.30
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.16
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =    9.81
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     300.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.81
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.759
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.24      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.24      SUBAREA RUNOFF(CFS) =    0.54
  EFFECTIVE AREA(ACRES) =      0.31   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.70

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   363.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   3.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.88
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.70
```

```
 PIPE TRAVEL TIME(MIN.) =   1.24    Tc(MIN.) =   11.05
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     663.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.05
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.577
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        2.53      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    2.53      SUBAREA RUNOFF(CFS) =    5.29
 EFFECTIVE AREA(ACRES) =      2.84   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       5.94

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.010
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.00
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.94
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.15
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     760.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.15
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.564
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.25      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.52
 EFFECTIVE AREA(ACRES) =      3.09   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       6.42

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  41
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.40
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.42
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   11.27
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     895.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.27
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.548
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.71      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.71      SUBAREA RUNOFF(CFS) =    1.47
  EFFECTIVE AREA(ACRES) =      3.80   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =       7.84

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.99
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.84
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.28
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =     900.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.28
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.547
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK              B        2.01      0.30      0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    2.01      SUBAREA RUNOFF(CFS) =    4.15
  EFFECTIVE AREA(ACRES) =      5.81   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      11.99

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0111
  FLOW LENGTH(FEET) =   231.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  12.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.30
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.99
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   11.80
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1131.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.80
  RAINFALL INTENSITY(INCH/HR) =   2.48
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.85
  EFFECTIVE STREAM AREA(ACRES) =       5.81
  TOTAL STREAM AREA(ACRES) =       5.81
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.99

****************************************************************************
  FLOW PROCESS FROM NODE      8.10 TO NODE      8.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.00  DOWNSTREAM(FEET) =    144.55

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.542
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.648
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK              B        0.76      0.30      0.850    56   10.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      1.64
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      1.64

****************************************************************************
  FLOW PROCESS FROM NODE      8.20 TO NODE      8.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   5.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.92
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.64
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   11.01
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =     467.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.01
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.582
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.51      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.51      SUBAREA RUNOFF(CFS) =    1.17
  EFFECTIVE AREA(ACRES) =      1.27   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       2.76

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0077
  FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.39
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.76
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   11.15
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.00 =     504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.15
  RAINFALL INTENSITY(INCH/HR) =   2.56
  AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.55
  EFFECTIVE STREAM AREA(ACRES) =       1.27
  TOTAL STREAM AREA(ACRES) =       1.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.76

****************************************************************************
  FLOW PROCESS FROM NODE      8.40 TO NODE      8.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   255.00
  ELEVATION DATA: UPSTREAM(FEET) =    147.00  DOWNSTREAM(FEET) =    142.68

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.305
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.554
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.45      0.30      0.100    56    6.31
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.43
  TOTAL AREA(ACRES) =      0.45   PEAK FLOW RATE(CFS) =      1.43

****************************************************************************
  FLOW PROCESS FROM NODE      8.50 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0557
  FLOW LENGTH(FEET) =    37.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.34
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.43
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    6.39
  LONGEST FLOWPATH FROM NODE      8.40 TO NODE      8.00 =     292.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.39
  RAINFALL INTENSITY(INCH/HR) =   3.53
```

```
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.45
 TOTAL STREAM AREA(ACRES) =       0.45
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.43

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       11.99   11.80    2.482  0.30( 0.26) 0.85       5.8       1.00
     2        2.76   11.15    2.563  0.30( 0.16) 0.55       1.3       8.10
     3        1.43    6.39    3.527  0.30( 0.03) 0.10       0.4       8.40

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       13.18    6.39    3.527  0.30( 0.22) 0.72       4.3       8.40
     2       15.54   11.15    2.563  0.30( 0.23) 0.75       7.2       8.10
     3       15.66   11.80    2.482  0.30( 0.23) 0.75       7.5       1.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      15.66    Tc(MIN.) =    11.80
 EFFECTIVE AREA(ACRES) =       7.53   AREA-AVERAGED Fm(INCH/HR) =  0.23
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
 TOTAL AREA(ACRES) =        7.5
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1131.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =   261.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.98
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.66
 PIPE TRAVEL TIME(MIN.) =   0.87    Tc(MIN.) =   12.68
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1392.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.68
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.382
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
 COMMERCIAL                 B        0.50      0.30     0.100    56
 PUBLIC PARK                B        3.13      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.747
 SUBAREA AREA(ACRES) =    3.63      SUBAREA RUNOFF(CFS) =    7.05
 EFFECTIVE AREA(ACRES) =     11.16   AREA-AVERAGED Fm(INCH/HR) =  0.23
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
 TOTAL AREA(ACRES) =       11.2       PEAK FLOW RATE(CFS) =      21.66

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       22.02    7.19    3.297  0.30( 0.22) 0.73       8.0       8.40
     2       21.75   12.03    2.454  0.30( 0.22) 0.75      10.8       8.10
     3       21.66   12.68    2.382  0.30( 0.23) 0.75      11.2       1.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      22.02  Tc(MIN.) =    7.19
 AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.73  EFFECTIVE AREA(ACRES) =       7.95

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.19
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.297
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.33      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    0.90
 EFFECTIVE AREA(ACRES) =      8.28   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
 TOTAL AREA(ACRES) =       11.5       PEAK FLOW RATE(CFS) =      22.93

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.19
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.297
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.22      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.60
 EFFECTIVE AREA(ACRES) =      8.50   AREA-AVERAGED Fm(INCH/HR) =  0.22
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.74
 TOTAL AREA(ACRES) =       11.7       PEAK FLOW RATE(CFS) =      23.53

****************************************************************************
```

```
 FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.49
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      23.53
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    7.29
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    1437.40 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    43.70   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  15.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.29
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      23.53
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    7.38
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     11.00 =    1481.10 FEET.

**********************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  41
----------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
======================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    93.90   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  15.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.29
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      23.53
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    7.57
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =    1575.00 FEET.
======================================================================
======================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   314.00
 ELEVATION DATA: UPSTREAM(FEET) =    154.00  DOWNSTREAM(FEET) =    148.60

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.799
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.482
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL POOR COVER
 "BARREN"                   B        0.88      0.30     1.000    86   11.80
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.73
 TOTAL AREA(ACRES) =      0.88   PEAK FLOW RATE(CFS) =      1.73

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.50 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    148.60  DOWNSTREAM(FEET) =    143.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   472.00   CHANNEL SLOPE =  0.0100
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.73
 FLOW VELOCITY(FEET/SEC) =   1.67 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   4.72   Tc(MIN.) =   16.52
 LONGEST FLOWPATH FROM NODE     21.00 TO NODE     22.50 =     786.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   16.52
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.047
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.48      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.48      SUBAREA RUNOFF(CFS) =    0.77
 EFFECTIVE AREA(ACRES) =      1.36   AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.95
 TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       2.16

****************************************************************************
 FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.52
  RAINFALL INTENSITY(INCH/HR) =   2.05
  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.95
  EFFECTIVE STREAM AREA(ACRES) =       1.36
  TOTAL STREAM AREA(ACRES) =       1.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.16

****************************************************************************
  FLOW PROCESS FROM NODE     22.51 TO NODE     22.52 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   283.30
  ELEVATION DATA: UPSTREAM(FEET) =    150.40  DOWNSTREAM(FEET) =    147.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.224
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.288
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.71      0.30     0.100    56    7.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.08
  TOTAL AREA(ACRES) =      0.71   PEAK FLOW RATE(CFS) =      2.08

****************************************************************************
  FLOW PROCESS FROM NODE     22.52 TO NODE     22.53 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
==============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  STREET LENGTH(FEET) =   220.70   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.15
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.70
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.82
```

```
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.69
 STREET FLOW TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =    9.24
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.855
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.84      0.30      0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    2.14
 EFFECTIVE AREA(ACRES) =      1.55    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       3.94

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  13.95
 FLOW VELOCITY(FEET/SEC.) =  1.91   DEPTH*VELOCITY(FT*FT/SEC.) =   0.77
 LONGEST FLOWPATH FROM NODE     22.51 TO NODE     22.53 =     504.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.53 TO NODE     22.53 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.24
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.855
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.15      0.30      0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.38
 EFFECTIVE AREA(ACRES) =      1.70   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       4.32

****************************************************************************
 FLOW PROCESS FROM NODE     22.53 TO NODE     22.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.41
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.32
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    9.40
 LONGEST FLOWPATH FROM NODE     22.51 TO NODE     22.50 =     554.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.40
  RAINFALL INTENSITY(INCH/HR) =   2.83
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.70
  TOTAL STREAM AREA(ACRES) =       1.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.32

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.16   16.52    2.047  0.30( 0.28) 0.95       1.4      21.00
      2        4.32    9.40    2.828  0.30( 0.03) 0.10       1.7      22.51

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.09    9.40    2.828  0.30( 0.11) 0.36       2.5      22.51
      2        5.27   16.52    2.047  0.30( 0.14) 0.48       3.1      21.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       6.09    Tc(MIN.) =     9.40
  EFFECTIVE AREA(ACRES) =       2.47   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.36
  TOTAL AREA(ACRES) =        3.1
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     22.50 =     786.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    143.90  DOWNSTREAM(FEET) =    139.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   325.40   CHANNEL SLOPE =  0.0126
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.09
  FLOW VELOCITY(FEET/SEC) =   2.48 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.18   Tc(MIN.) =   11.58
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =    1111.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.58
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.508
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  PUBLIC PARK                B        0.25      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.51
  EFFECTIVE AREA(ACRES) =      2.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =       6.09
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.58
  RAINFALL INTENSITY(INCH/HR) =   2.51
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.41
  EFFECTIVE STREAM AREA(ACRES) =       2.72
  TOTAL STREAM AREA(ACRES) =       3.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.09

****************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     23.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   285.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.80  DOWNSTREAM(FEET) =    147.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.521
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.399
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        0.84      0.30     1.000    86   12.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.59
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      1.59

****************************************************************************
  FLOW PROCESS FROM NODE     23.20 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    147.80  DOWNSTREAM(FEET) =    139.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   815.80   CHANNEL SLOPE =  0.0101
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.59
  FLOW VELOCITY(FEET/SEC) =   1.65 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
 TRAVEL TIME(MIN.) =   8.26   Tc(MIN.) =   20.78
 LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1100.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   20.78
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.794
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "BARREN"                    B        1.81      0.30     1.000    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    2.43
 EFFECTIVE AREA(ACRES) =      2.65   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       3.56

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   20.78
 RAINFALL INTENSITY(INCH/HR) =   1.79
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       2.65
 TOTAL STREAM AREA(ACRES) =       2.65
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.56

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        6.09   11.58    2.508  0.30( 0.12) 0.41       2.7      22.51
     1        5.27   18.78    1.902  0.30( 0.15) 0.50       3.3      21.00
     2        3.56   20.78    1.794  0.30( 0.30) 1.00       2.6      23.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        9.03   11.58    2.508  0.30( 0.19) 0.62       4.2      22.51
     2        8.72   18.78    1.902  0.30( 0.21) 0.71       5.7      21.00
     3        8.51   20.78    1.794  0.30( 0.22) 0.72       6.0      23.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =       9.03    Tc(MIN.) =    11.58
  EFFECTIVE AREA(ACRES) =       4.20   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.62
  TOTAL AREA(ACRES) =        6.0
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =    1111.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.58
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.508
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        1.49      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    1.49      SUBAREA RUNOFF(CFS) =    3.02
  EFFECTIVE AREA(ACRES) =      5.69   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =        7.4       PEAK FLOW RATE(CFS) =      11.81

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    45.70   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.68
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.81
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   11.70
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     24.00 =    1157.10 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        7.4  TC(MIN.) =     11.70
  EFFECTIVE AREA(ACRES) =      5.69  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.678
  PEAK FLOW RATE(CFS)   =      11.81

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1       11.81   11.70    2.494  0.30( 0.20) 0.68       5.7       22.51
      2       10.87   18.91    1.895  0.30( 0.22) 0.74       7.2       21.00
      3       10.52   20.91    1.788  0.30( 0.22) 0.75       7.4       23.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Appendix J

Proposed Q_{25} Hydrology Calculations

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2008 Advanced Engineering Software (aes)
             Ver. 15.0  Release Date: 04/01/2008  License ID 1204

                          Analysis prepared by:

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 ************************** DESCRIPTION OF STUDY **************************
* 25-YEAR STORM EVENT HYDROLOGY ANALYSIS                                  *
* OAKCREEK COMMUNITY PARK, IRVINE CALIFORNIA                              *
* PROPOSED CONDITION                                                      *
 **************************************************************************

  FILE NAME: OAK25PRA.DAT
  TIME/DATE OF STUDY: 16:23 04/04/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.50    2.00 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   251.00
  ELEVATION DATA: UPSTREAM(FEET) =    157.00  DOWNSTREAM(FEET) =    151.80
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.562
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.342
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                B        0.07      0.30     0.850    56    9.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.07   PEAK FLOW RATE(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =    49.40   MANNING'S N =  0.010
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.46
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.19
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    9.80
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     300.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.80
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.296
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.24      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.24      SUBAREA RUNOFF(CFS) =    0.66
  EFFECTIVE AREA(ACRES) =      0.31   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.85

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   363.00   MANNING'S N =  0.010
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.13
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.85
```

```
 PIPE TRAVEL TIME(MIN.) =   1.18    Tc(MIN.) =   10.98
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     663.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.98
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.090
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        2.53      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    2.53      SUBAREA RUNOFF(CFS) =    6.46
 EFFECTIVE AREA(ACRES) =      2.84   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        2.8       PEAK FLOW RATE(CFS) =       7.25

****************************************************************************
 FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0150
 FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.010
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.76
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.25
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   11.06
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      5.00 =     760.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.06
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.078
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 PUBLIC PARK                B        0.25      0.30     0.850    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.64
 EFFECTIVE AREA(ACRES) =      3.09   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       7.85

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  41
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.49
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.85
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.16
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      6.00 =     895.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.16
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.062
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.71      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.71      SUBAREA RUNOFF(CFS) =    1.79
  EFFECTIVE AREA(ACRES) =      3.80   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =       9.60

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.22
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.60
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.16
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      7.00 =     900.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.16
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.061
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK              B        2.01      0.30      0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    2.01      SUBAREA RUNOFF(CFS) =    5.08
  EFFECTIVE AREA(ACRES) =      5.81   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      14.67

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0111
  FLOW LENGTH(FEET) =   231.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.66
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.67
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =   11.67
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1131.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.67
  RAINFALL INTENSITY(INCH/HR) =   2.99
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.85
  EFFECTIVE STREAM AREA(ACRES) =       5.81
  TOTAL STREAM AREA(ACRES) =       5.81
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.67

****************************************************************************
  FLOW PROCESS FROM NODE      8.10 TO NODE      8.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.00  DOWNSTREAM(FEET) =    144.55

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.542
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.162
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK              B        0.76      0.30      0.850    56   10.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      1.99
  TOTAL AREA(ACRES) =      0.76   PEAK FLOW RATE(CFS) =      1.99

****************************************************************************
  FLOW PROCESS FROM NODE      8.20 TO NODE      8.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0150
  FLOW LENGTH(FEET) =   167.00   MANNING'S N =  0.010
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.70
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.99
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   11.03
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =     467.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.03
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.082
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.51      0.30     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.51      SUBAREA RUNOFF(CFS) =    1.40
  EFFECTIVE AREA(ACRES) =      1.27   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       3.33

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0077
  FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.62
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.33
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   11.16
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.00 =     504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
================================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.16
  RAINFALL INTENSITY(INCH/HR) =   3.06
  AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.55
  EFFECTIVE STREAM AREA(ACRES) =       1.27
  TOTAL STREAM AREA(ACRES) =       1.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.33

****************************************************************************
  FLOW PROCESS FROM NODE      8.40 TO NODE      8.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   255.00
  ELEVATION DATA: UPSTREAM(FEET) =    147.00  DOWNSTREAM(FEET) =    142.68

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.305
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.230
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.45      0.30     0.100    56    6.31
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.70
  TOTAL AREA(ACRES) =      0.45   PEAK FLOW RATE(CFS) =      1.70

****************************************************************************
  FLOW PROCESS FROM NODE      8.50 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0557
  FLOW LENGTH(FEET) =    37.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.75
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.70
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    6.39
  LONGEST FLOWPATH FROM NODE      8.40 TO NODE      8.00 =     292.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.39
```

```
 RAINFALL INTENSITY(INCH/HR) =   4.20
 AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.45
 TOTAL STREAM AREA(ACRES) =       0.45
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.70

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       14.67   11.67    2.986  0.30( 0.26) 0.85       5.8       1.00
     2        3.33   11.16    3.061  0.30( 0.16) 0.55       1.3       8.10
     3        1.70    6.39    4.200  0.30( 0.03) 0.10       0.4       8.40

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       15.96    6.39    4.200  0.30( 0.22) 0.72       4.4       8.40
     2       19.00   11.16    3.061  0.30( 0.23) 0.75       7.3       8.10
     3       19.13   11.67    2.986  0.30( 0.23) 0.75       7.5       1.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      19.13    Tc(MIN.) =    11.67
 EFFECTIVE AREA(ACRES) =       7.53   AREA-AVERAGED Fm(INCH/HR) =  0.23
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
 TOTAL AREA(ACRES) =        7.5
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      8.00 =    1131.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =   261.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.09
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      19.13
 PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =   12.38
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      9.00 =    1392.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.38
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.887
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL               B        0.50      0.30      0.100    56
  PUBLIC PARK              B        3.13      0.30      0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.747
  SUBAREA AREA(ACRES) =    3.63      SUBAREA RUNOFF(CFS) =    8.70
  EFFECTIVE AREA(ACRES) =     11.16   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =       11.2       PEAK FLOW RATE(CFS) =      26.73

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       26.53    7.24    3.911  0.30( 0.22) 0.73       8.0       8.40
      2       26.81   11.88    2.955  0.30( 0.22) 0.75      10.9       8.10
      3       26.73   12.38    2.887  0.30( 0.23) 0.75      11.2       1.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      26.81  Tc(MIN.) =   11.88
  AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.75  EFFECTIVE AREA(ACRES) =      10.91

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.88
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK              B        0.33      0.30      0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.33      SUBAREA RUNOFF(CFS) =    0.80
  EFFECTIVE AREA(ACRES) =     11.24   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =       11.5       PEAK FLOW RATE(CFS) =      27.61

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.88
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.955
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK              B        0.22      0.30      0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.22      SUBAREA RUNOFF(CFS) =    0.53
  EFFECTIVE AREA(ACRES) =     11.46   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =       11.7       PEAK FLOW RATE(CFS) =      28.14
```

```
  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       28.34    7.24    3.911  0.30( 0.22) 0.74       8.5       8.40
      2       28.14   11.88    2.955  0.30( 0.23) 0.75      11.5       8.10
      3       28.04   12.38    2.887  0.30( 0.23) 0.76      11.7       1.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      28.34  Tc(MIN.) =    7.24
  AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.74  EFFECTIVE AREA(ACRES) =       8.54

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.02
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.34
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.33
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     10.00 =    1437.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    43.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  16.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.71
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.34
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    7.41
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     11.00 =    1481.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    93.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  16.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.71
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.34
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    7.59
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE     12.00 =    1575.00 FEET.
============================================================================
```

==========

END OF RATIONAL METHOD ANALYSIS

```
****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   314.00
  ELEVATION DATA: UPSTREAM(FEET) =    154.00  DOWNSTREAM(FEET) =    148.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.799
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.967
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        0.88      0.30     1.000    86   11.80
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.11
  TOTAL AREA(ACRES) =      0.88   PEAK FLOW RATE(CFS) =      2.11

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    148.60  DOWNSTREAM(FEET) =    143.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   472.00   CHANNEL SLOPE =  0.0100
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.11
  FLOW VELOCITY(FEET/SEC) =   1.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.53   Tc(MIN.) =   16.33
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     22.50 =     786.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.33
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.469
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.48      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.48      SUBAREA RUNOFF(CFS) =    0.96
  EFFECTIVE AREA(ACRES) =      1.36   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       2.67

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.33
  RAINFALL INTENSITY(INCH/HR) =   2.47
  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.95
  EFFECTIVE STREAM AREA(ACRES) =       1.36
  TOTAL STREAM AREA(ACRES) =       1.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.67

**************************************************************************
  FLOW PROCESS FROM NODE     22.51 TO NODE     22.52 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   283.30
  ELEVATION DATA: UPSTREAM(FEET) =    150.40  DOWNSTREAM(FEET) =    147.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.224
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.917
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.71      0.30     0.100    56    7.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      2.48
  TOTAL AREA(ACRES) =      0.71   PEAK FLOW RATE(CFS) =      2.48

**************************************************************************
  FLOW PROCESS FROM NODE     22.52 TO NODE     22.53 IS CODE =  61
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
==========================================================================
  REPRESENTATIVE SLOPE =  0.0050
  STREET LENGTH(FEET) =   220.70   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.77
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.63
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.91
```

```
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.76
 STREET FLOW TRAVEL TIME(MIN.) =   1.93   Tc(MIN.) =    9.15
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.426
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.84      0.30      0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.84      SUBAREA RUNOFF(CFS) =    2.57
 EFFECTIVE AREA(ACRES) =      1.55    AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       4.74

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.96
 FLOW VELOCITY(FEET/SEC.) =  2.01   DEPTH*VELOCITY(FT*FT/SEC.) =   0.86
 LONGEST FLOWPATH FROM NODE     22.51 TO NODE     22.53 =     504.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.53 TO NODE     22.53 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.15
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.426
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        0.15      0.30      0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.46
 EFFECTIVE AREA(ACRES) =      1.70   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       5.20

****************************************************************************
 FLOW PROCESS FROM NODE     22.53 TO NODE     22.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0100
 FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.60
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.20
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    9.30
 LONGEST FLOWPATH FROM NODE     22.51 TO NODE     22.50 =     554.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.50 TO NODE     22.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
```

```
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.30
  RAINFALL INTENSITY(INCH/HR) =   3.39
  AREA-AVERAGED Fm(INCH/HR) =  0.03
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.70
  TOTAL STREAM AREA(ACRES) =       1.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.20

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.67   16.33    2.469  0.30( 0.28) 0.95       1.4      21.00
      2        5.20    9.30    3.394  0.30( 0.03) 0.10       1.7      22.51

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.36    9.30    3.394  0.30( 0.11) 0.37       2.5      22.51
      2        6.44   16.33    2.469  0.30( 0.14) 0.48       3.1      21.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.36    Tc(MIN.) =     9.30
  EFFECTIVE AREA(ACRES) =       2.47   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =        3.1
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     22.50 =     786.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.50 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    143.90  DOWNSTREAM(FEET) =    139.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   325.40   CHANNEL SLOPE =  0.0126
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.36
  FLOW VELOCITY(FEET/SEC) =   2.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.09   Tc(MIN.) =   11.39
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =    1111.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.027
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  PUBLIC PARK                B        0.25      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    0.62
  EFFECTIVE AREA(ACRES) =      2.72   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =       7.36
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.39
  RAINFALL INTENSITY(INCH/HR) =   3.03
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.41
  EFFECTIVE STREAM AREA(ACRES) =       2.72
  TOTAL STREAM AREA(ACRES) =       3.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.36

****************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     23.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   285.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.80  DOWNSTREAM(FEET) =    147.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.521
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.869
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        0.84      0.30     1.000    86   12.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.94
  TOTAL AREA(ACRES) =      0.84   PEAK FLOW RATE(CFS) =      1.94

****************************************************************************
  FLOW PROCESS FROM NODE     23.20 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    147.80  DOWNSTREAM(FEET) =    139.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   815.80   CHANNEL SLOPE =  0.0101
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.94
  FLOW VELOCITY(FEET/SEC) =   1.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
 TRAVEL TIME(MIN.) =   7.93   Tc(MIN.) =   20.45
 LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =    1100.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   20.45
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.173
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "BARREN"                    B        1.81      0.30     1.000    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    3.05
 EFFECTIVE AREA(ACRES) =      2.65   AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       4.47

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   20.45
 RAINFALL INTENSITY(INCH/HR) =   2.17
 AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       2.65
 TOTAL STREAM AREA(ACRES) =       2.65
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.47

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        7.36   11.39    3.027  0.30( 0.12) 0.41       2.7      22.51
     1        6.44   18.48    2.301  0.30( 0.15) 0.50       3.3      21.00
     2        4.47   20.45    2.173  0.30( 0.30) 1.00       2.6      23.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       10.99   11.39    3.027  0.30( 0.19) 0.62       4.2      22.51
     2       10.75   18.48    2.301  0.30( 0.21) 0.71       5.7      21.00
     3       10.52   20.45    2.173  0.30( 0.22) 0.72       6.0      23.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =      10.99    Tc(MIN.) =    11.39
  EFFECTIVE AREA(ACRES) =       4.20   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.62
  TOTAL AREA(ACRES) =        6.0
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =    1111.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.027
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        1.49      0.30     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    1.49      SUBAREA RUNOFF(CFS) =    3.72
  EFFECTIVE AREA(ACRES) =      5.69   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =        7.4       PEAK FLOW RATE(CFS) =      14.46

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  FLOW LENGTH(FEET) =    45.70   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.18
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.46
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   11.48
  LONGEST FLOWPATH FROM NODE     21.00 TO NODE     24.00 =    1157.10 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        7.4  TC(MIN.) =     11.48
  EFFECTIVE AREA(ACRES) =      5.69  AREA-AVERAGED Fm(INCH/HR)=  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 0.678
  PEAK FLOW RATE(CFS)   =      14.46

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1       14.46   11.48    3.013  0.30( 0.20) 0.68       5.7       22.51
      2       13.46   18.58    2.294  0.30( 0.22) 0.74       7.2       21.00
      3       13.06   20.55    2.167  0.30( 0.22) 0.75       7.4       23.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Appendix K

Hydrology Map - Existing Condition

VALLEY OAK DRIVE

SAND CANYON AVENUE

SOUTHERN CALIFORNIA EDISON COMPANY

BARRANCA PKWY

LINE 'A'

LINE 'B'

LINE 'C'

A-1 0.07

A-2 0.24

A-3 0.46

A-4 0.11

A-5 0.77

A-6 3.91

A-7 0.76

A-8 0.60

A-9 0.44

A-10 0.52

A-11 3.04

A-12 0.31

B-1 0.63

B-2 4.59

B-3 0.84

B-4 1.81

1.0 157.6 FL HIGH POINT

2.0 151.8 TG
149.8 INV.
T_{C25}=9.36 min
Q_2=0.08 cfs
Q_{10}=0.16 cfs
Q_{25}=0.20 cfs

3.0 151.08 TG
148.99 INV.
T_{C25}=9.59 min
Q_2=0.37 cfs
Q_{10}=0.71 cfs
Q_{25}=0.86 cfs

4.0 146.93 TG/LP
143.28 INV.
T_{C25}=10.77 min
Q_2=0.83 cfs
Q_{10}=1.63 cfs
Q_{25}=1.99 cfs

5.0 145.83 TG
141.83 INV.
T_{C25}=11.05 min
Q_2=0.93 cfs
Q_{10}=1.83 cfs
Q_{25}=2.24 cfs

6.0 139.80 INV.
T_{C25}=11.40 min
Q_2=1.70 cfs
Q_{10}=3.36 cfs
Q_{25}=4.11 cfs

7.0 EXISTING GRATE INLET
144.43 TG/LP
138.43 INV.
T_{C25}=11.41 min
Q_2=5.72 cfs
Q_{10}=11.30 cfs
Q_{25}=13.85 cfs

8.1 150.0 FL HIGH POINT

8.2 144.55 TG/LP
143.05 INV.
T_{C25}=10.54 min
Q_2=0.83 cfs
Q_{10}=1.64 cfs
Q_{25}=1.99 cfs

8.3 143.2 FL/LP
140.55 INV-8" PVC
136.54 INV. 18" RCP
T_{C25}=11.03 min
Q_2=1.56 cfs
Q_{10}=2.97 cfs
Q_{25}=3.58 cfs

8.4 147.0 FL HIGH POINT

8.0 136.10 INV.
T_{C25}=11.92 min
Q_2=7.73 cfs
Q_{10}=15.09 cfs
Q_{25}=18.46 cfs

8.5 142.68 FL/LP
138.30 INV
T_{C25}=6.26 min
Q_2=0.78 cfs
Q_{10}=1.40 cfs
Q_{25}=1.67 cfs

9.0 133.96 INV.
T_{C25}=7.23 min
Q_2=11.51 cfs
Q_{10}=22.25 cfs
Q_{25}=26.74 cfs

10.0 133.76 INV.
132.76 INV.
T_{C25}=7.32 min
Q_2=11.51 cfs
Q_{10}=22.25 cfs
Q_{25}=26.74 cfs

11.0 136.10 INV.
T_{C25}=7.41 min
Q_2=11.51 cfs
Q_{10}=22.25 cfs
Q_{25}=26.74 cfs

12.0 131.41 INV.
T_{C25}=7.59 min
Q_2=11.51 cfs
Q_{10}=22.25 cfs
Q_{25}=26.74 cfs

21.0 154.0 FL HIGH POINT

22.0 149.0 INV.
T_{C25}=5.00 min
Q_2=1.11 cfs
Q_{10}=2.13 cfs
Q_{25}=2.56 cfs

23.0 CONFLUENCE
133.26 INV.
T_{C25}=12.65 min
Q_2= 5.96 cfs
Q_{10}=12.73 cfs
Q_{25}=15.80 cfs

23.0 139.9 FL/LP
T_{C25}=20.23 min
Q_2=1.63 cfs
Q_{10}=3.59 cfs
Q_{25}=4.50 cfs

23.1 150.8 FL HIGH POINT

23.2 147.8 FL
T_{C25}=12.52 min
Q_2=0.78 cfs
Q_{10}=1.59 cfs
Q_{25}=1.94 cfs

24.0 132.43 INV.
T_{C25}=12.74 min
Q_2=5.96 cfs
Q_{10}=12.73 cfs
Q_{25}=15.80 cfs

24.0 139.9 FL/LP
133.26 INV.
T_{C25}=12.65 min
Q_2=4.46 cfs
Q_{10}=9.64 cfs
Q_{25}=11.99 cfs

L=251'
L=49'
EX. 6" PVC
L=363'
EX. 8" PVC @ S=0.0150
L=300'
EX. 8" PVC @ S=0.0150
L=167'
EX. 8" PVC @ S=0.0150
EX. 18" RCP @ S=0.0077 L=37.0'
L=261'
EX. 24" RCP @ S=0.0050
EX. 18" RCP @ S=0.0557 L=37.7'
L=232.7'
L=231'
EX. 24" RCP @ S=0.0111
L=135'
EX. 8" PVC @ S=0.0150
L=97'
8" PVC @ S=0.0150
EX. 8" PVC
EX. 6" PCV
L=5' EX. 12" PVC @ S=0.0150
EX. 36" RCP @ S=0.0100 L=93.9'
EX. 36" RCP @ S=0.010 L=43.7'
EX. 36" RCP @ S=0.010
EX. 24" RCP @ S=0.0050 L=45'
EX. 78" RCP
EX. 18" RCP @ S=0.0325
EX. 18" RCP @ S=0.0100 L=45.7'
EX. 24" CSP RISER
L=858'
L=791'
L=235'
L=280'

LEGEND:

- FLOW PATH
- BOUNDARY LINE
- 1520 CONTOURS
- DRAINAGE AREA BOUNDARY
- DRAINAGE SUB-AREA BOUNDARY
- 10.0 100.0 ELEV. FLOW PROCESS NODE / ELEVATION
- T_c = 3.00 min TIME OF CONCENTRATION
- Q_{10}= 0.1 cfs PEAK FLOW RATE FOR 10 YEAR STORM
- Q_{25}= 0.1 cfs PEAK FLOW RATE FOR 25 YEAR STORM
- Q_{100}= 0.2 cfs PEAK FLOW RATE FOR 100 YEAR STORM
- A-1 / 1.0 DRAINAGE SUB-AREA DESIGNATION / DRAINAGE SUB-AREA ACREAGE

50' 25' 0' 50' 100'

GRAPHIC SCALE: 1"=50'

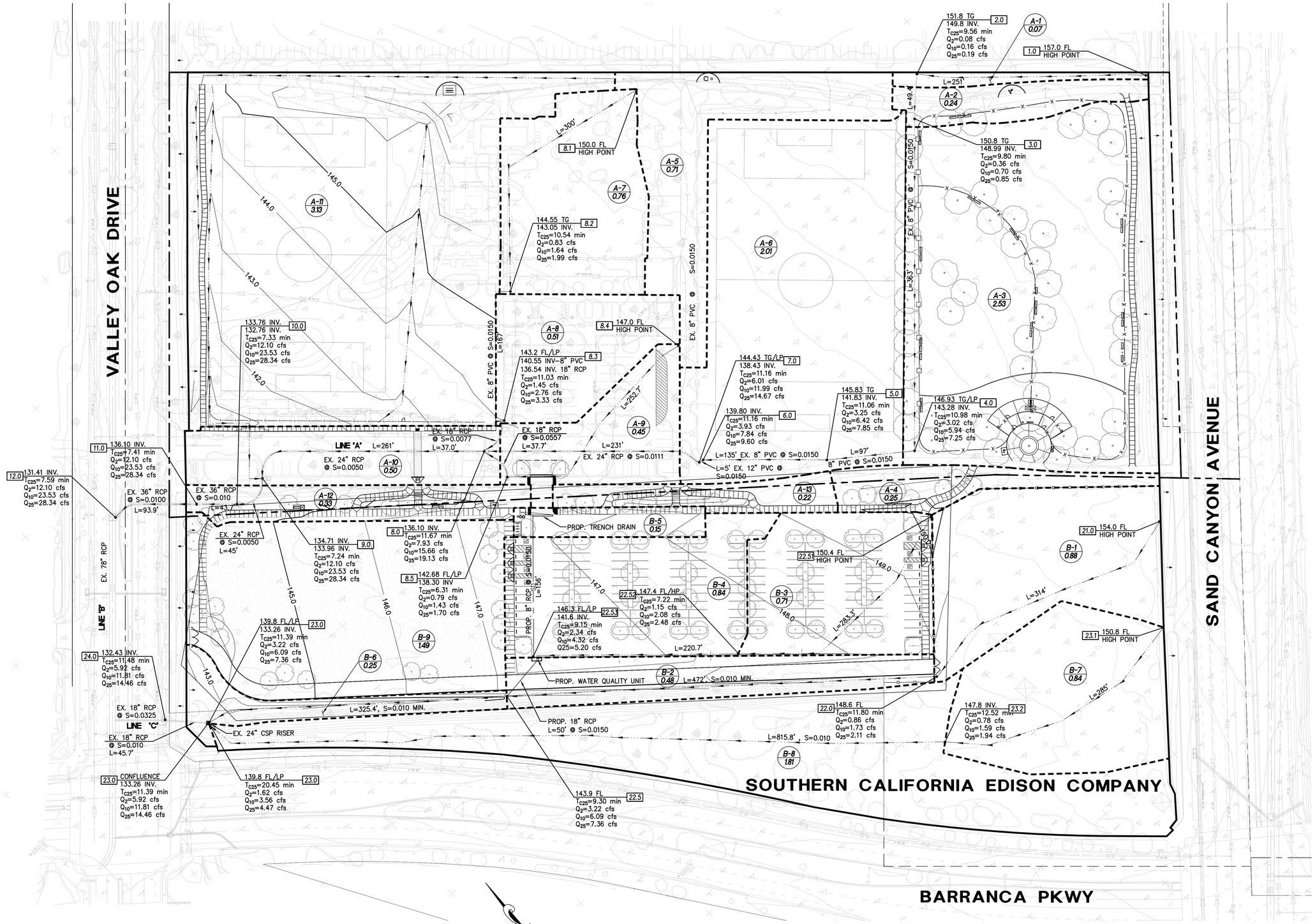
CITY OF IRVINE
OAK CREEK COMMUNITY PARK

PRELIMINARY HYDROLOGY MAP
EXISTING CONDITION

JOB NO.:	19-2260
DATE:	04/05/2022
DRAWNED BY:	GC
DESIGNED BY:	GC
APPROVED BY:	MO
SHEET	1 OF 1

Appendix L

Hydrology Map – Proposed Condition



LEGEND:

- FLOW PATH
- BOUNDARY LINE
- 1520 — CONTOURS
- DRAINAGE AREA BOUNDARY
- DRAINAGE SUB-AREA BOUNDARY
- FLOW PROCESS NODE
- 10.0 100.0 ELEV. — ELEVATION
- T_c = 3.00 min — TIME OF CONCENTRATION
- Q_{10}= 0.1 cfs — PEAK FLOW RATE FOR 10 YEAR STORM
- Q_{25}= 0.1 cfs — PEAK FLOW RATE FOR 25 YEAR STORM
- Q_{100}= 0.2 cfs — PEAK FLOW RATE FOR 100 YEAR STORM
- A-1 / 1.0 — DRAINAGE SUB-AREA DESIGNATION / DRAINAGE SUB-AREA ACREAGE

50' 25' 0' 50' 100'
GRAPHIC SCALE: 1"=50'

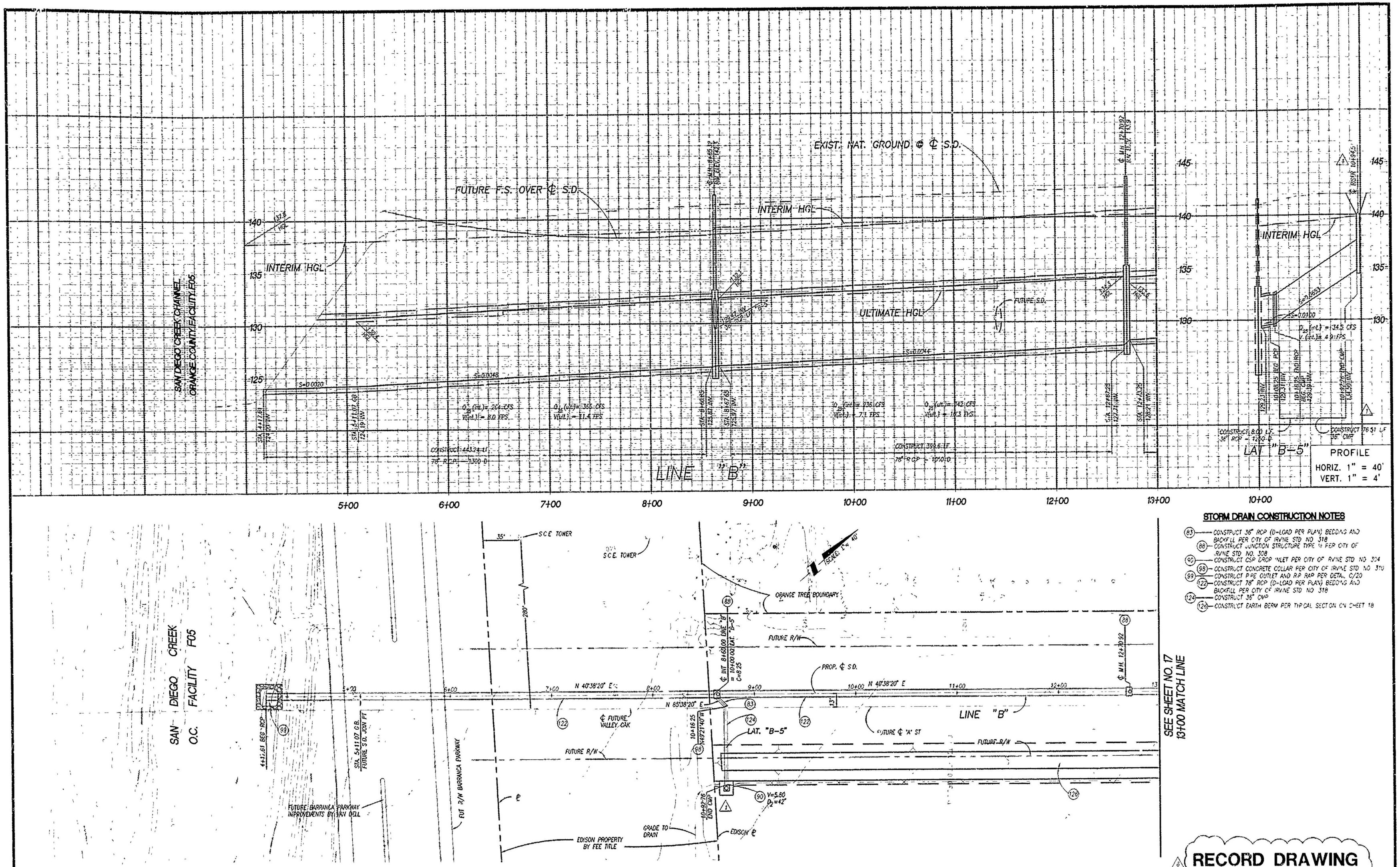
CITY OF IRVINE
OAK CREEK COMMUNITY PARK

PRELIMINARY HYDROLOGY MAP PROPOSED CONDITION

JOB NO.:	19-2260
DATE:	04/05/2022
DRAWNED BY:	GC
DESIGNED BY:	GC
APPROVED BY:	MO
SHEET	1 OF 1

Appendix M

Record Drawing Permit No. 30010-TC Storm Drain Improvement Line "B" sheet 16 of 40.



STORM DRAIN CONSTRUCTION NOTES

(83) CONSTRUCT 36" RCP (D-LOAD PER PLAN) BEDDING AND BACKFILL PER CITY OF IRVINE STD NO 318
(88) CONSTRUCT JUNCTION STRUCTURE TYPE 'H' PER CITY OF IRVINE STD NO. 308
(90) CONSTRUCT CSP DROP INLET PER CITY OF IRVINE STD NO 304
(98) CONSTRUCT CONCRETE COLLAR PER CITY OF IRVINE STD NO 310
(99) CONSTRUCT PIPE OUTLET AND R.P. RAP PER DETAIL C/20
(122) CONSTRUCT 78" RCP (D-LOAD PER PLAN) BEDDING AND BACKFILL PER CITY OF IRVINE STD NO 318
(124) CONSTRUCT 36" CMP
(126) CONSTRUCT EARTH BERM PER TYPICAL SECTION ON SHEET 18

RECORD DRAWING

NO	DATE	REVISIONS	APP	DATE
6				
5				
4				
3				
2				
1				

CITY OF IRVINE

DOUGLAS J. JOHNSON No. 47447 12/31/99

THE KEITH COMPANIES
Civil Engineering • Land Surveying
Mapping • Environmental Services
Water Resources • Land Planning
2955 Red Hill Avenue
Costa Mesa, CA 92626
(714)540-0800

DOUGLAS J. JOHNSON RCE 47447 10/26/98 (EXP. 12/31/99)

DEVELOPER:
THE IRVINE COMPANY
550 NEWPORT CENTER DRIVE
NEWPORT BEACH, CALIFORNIA 92658
(714) 720-2200

SOILS ENGINEER:
GOFFMAN McCORMICK AND URBAN, INC.
23241 ARROYO VISTA
RANCHO SANTA MARGARITA, CA 92688
(714) 888-6513

JOB NO: 12962.000
DATE APPROVED:
LAST REVISED 1/21/98

STREET IMPROVEMENT PLAN - PHASE 1
STORM DRAIN - LINE "B"
FROM STA. 4+17.61 TO STA. 13+00.00
CITY OF IRVINE
COMMUNITY DEVELOPMENT DEPARTMENT

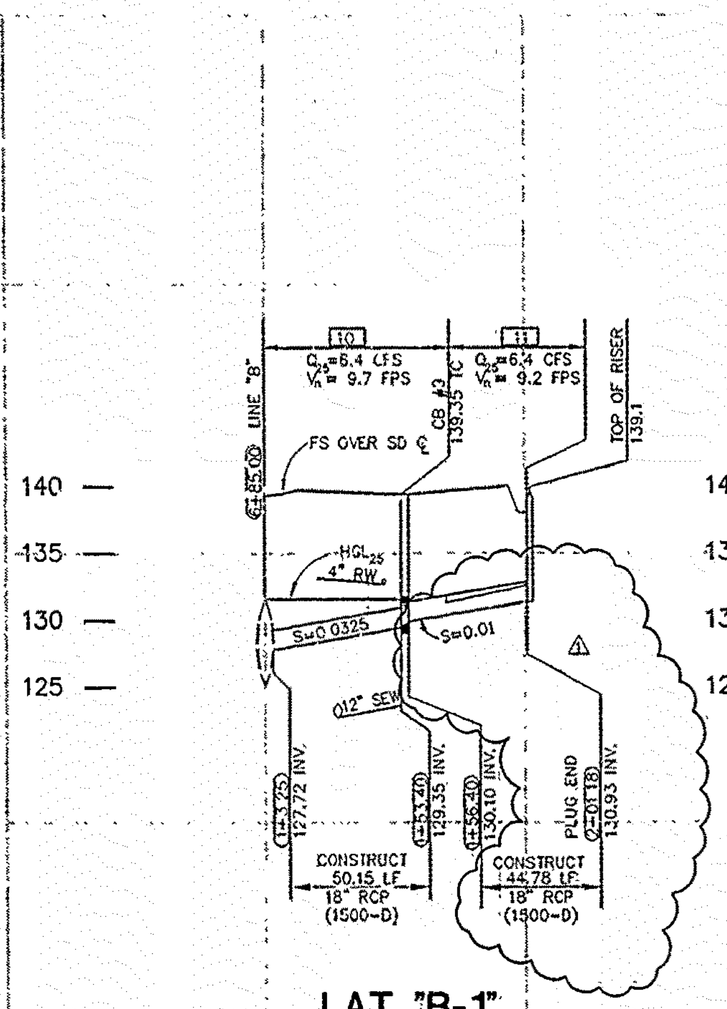
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SHEET 16 OF 40
JOB NO. 12962.000

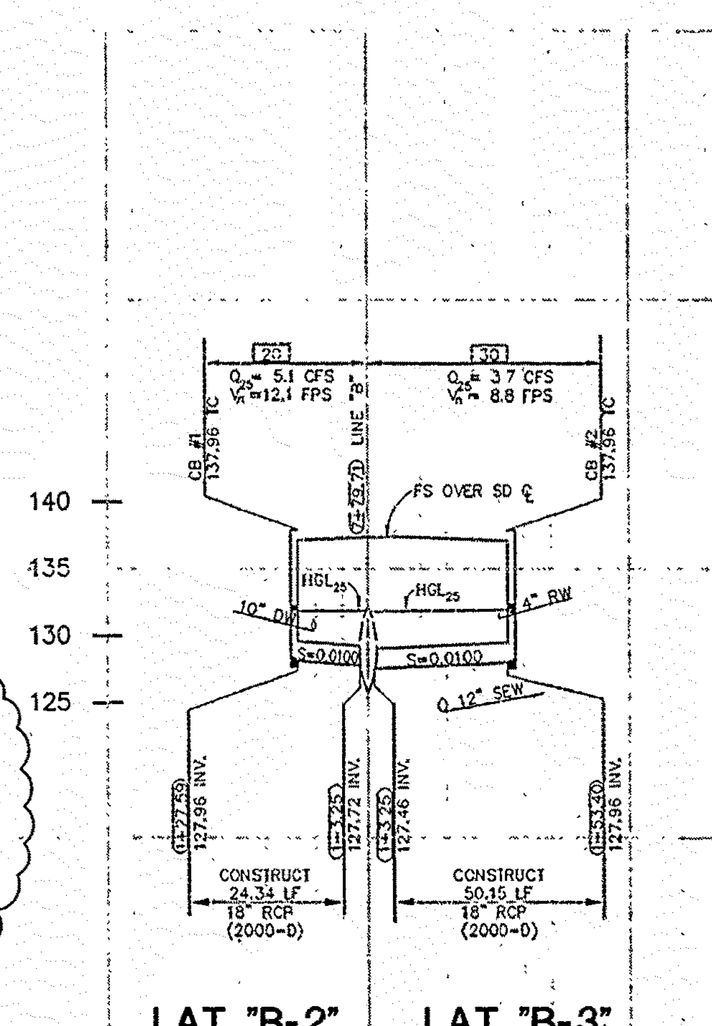
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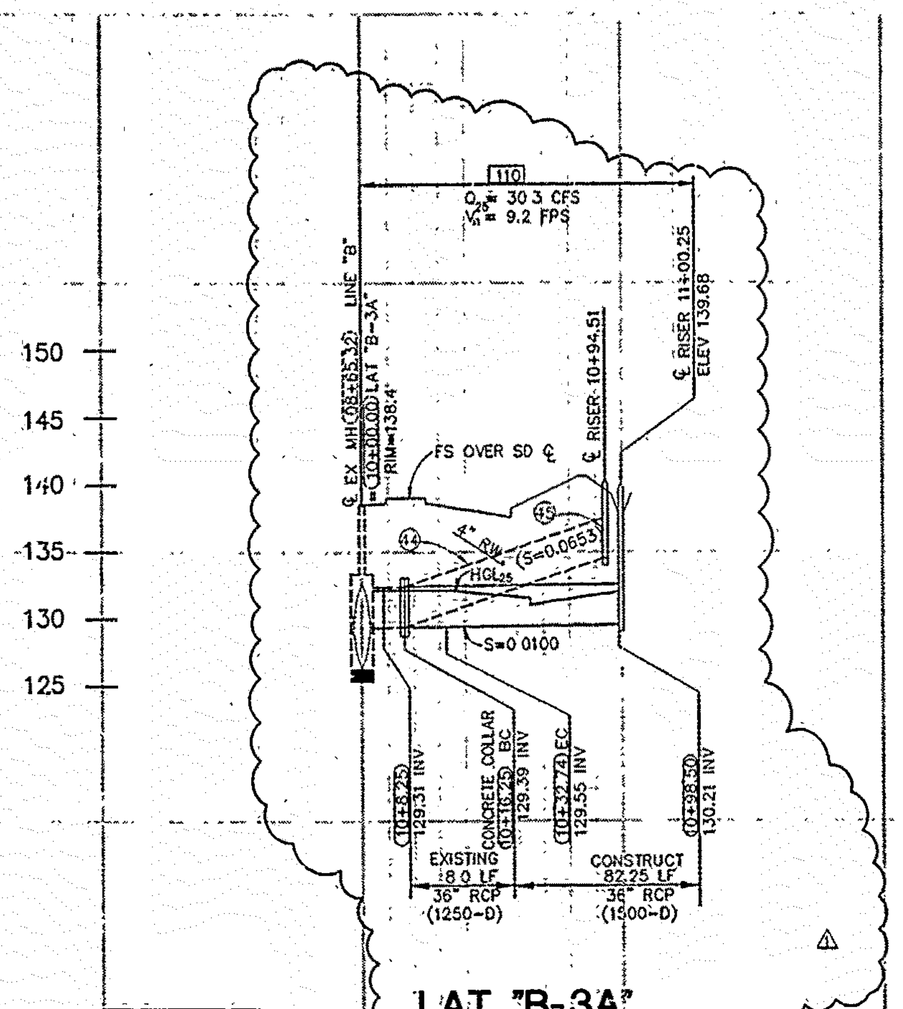
F-121

Appendix N

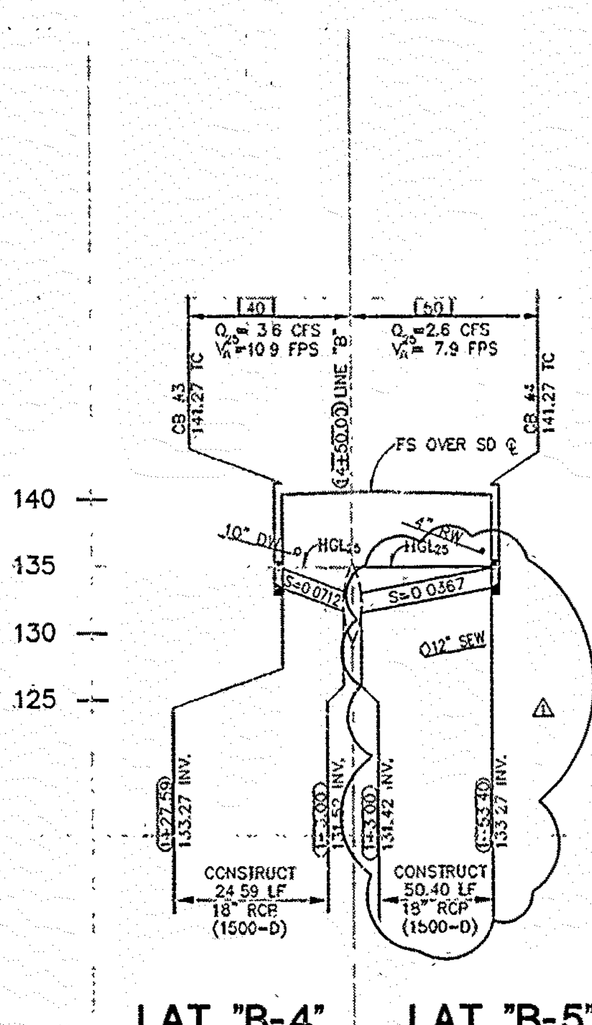
Record Drawing Project No. 34071-MC Valley Oak Plan And Profile Storm Drain Improvement Plan for Line “B” Laterals sheet 7 of 15.







PROFILE
PLAN 1"=40'
VERT 1"=8'
HORIZ 1"=40'

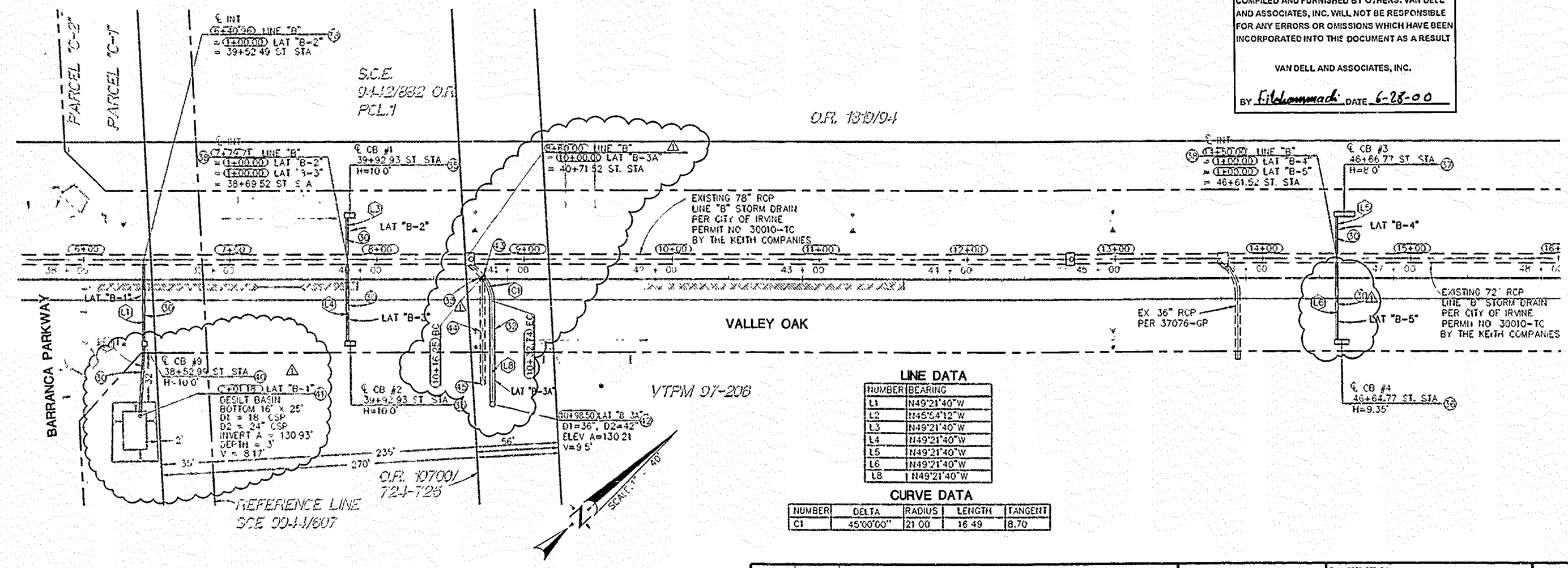


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VAN DELL AND ASSOCIATES, INC.

BY _____ DATE 6-28-00



LINE DATA

NUMBER	BEARING
L1	N49°21'40"W
L2	N45°54'12"W
L3	N49°21'40"W
L4	N49°21'40"W
L5	N49°21'40"W
L6	N49°21'40"W
L8	N49°21'40"W

CURVE DATA

NUMBER	DELTA	RADIUS	LENGTH	TANGENT
C1	45°00'00"	21.00	16.49	8.70

CONSTRUCTION NOTES:

30. CONSTRUCT 18" RCP (D-LOAD PER PROFILE) WITH BEDDING AND BACKFILL PER CITY OF IRVINE STANDARD PLAN NO. 318.
31. CONSTRUCT 30" RCP (D-LOAD PER PROFILE) WITH BEDDING AND BACKFILL PER CITY OF IRVINE STANDARD PLAN NO. 318.
32. CONSTRUCT 36" RCP (D-LOAD PER PROFILE) WITH BEDDING AND BACKFILL PER CITY OF IRVINE STANDARD PLAN NO. 318.
33. ⚠ REMOVE EXISTING CONCRETE COLLAR.
35. CONSTRUCT 7' CATCH BASIN TYPE I PER CITY OF IRVINE STANDARD PLAN NO. 301.
36. CONSTRUCT 10' CATCH BASIN TYPE II PER CITY OF IRVINE STANDARD PLAN NO 301
37. CONSTRUCT 14' CATCH BASIN TYPE II PER CITY OF IRVINE STANDARD PLAN NO. 301.
38. CONSTRUCT JUNCTION STRUCTURE TYPE V PER CITY OF IRVINE STANDARD PLAN NO. 309B.
40. CONSTRUCT 3.5' CATCH BASIN TYPE I PER CITY OF IRVINE STANDARD PLAN NO. 300
41. CONSTRUCT 24" RISER PER CITY OF IRVINE STANDARD PLAN NO. 304.
42. ⚠ CONSTRUCT 42" RISER PER CITY OF IRVINE STANDARD PLAN NO. 304.
43. ⚠ CONSTRUCT CONCRETE COLLAR PER CITY OF IRVINE STANDARD PLAN NO. 310
44. ⚠ REMOVE EXISTING 36" CMP PIPE.
45. ⚠ REMOVE EXISTING RISER.

0 20 40 80 120
GRAPHIC SCALE IN FEET

PREPARED FOR
IRVINE COMMUNITY DEVELOPMENT COMPANY

REGISTERED PROFESSIONAL ENGINEER
JAMIE C. YOSHIDA
No. 54758
Exp. 12/31/99
CIVIL
STATE OF CALIFORNIA

NO	DATE	REVISIONS
7		
6		
5		
4		
3		
2		
⚠	8-19-99	REVISED DESILT BASIN, LAT"B-1", LAT"B-3A", LAT"B-5".

DRAWN BY: KAE DATE 8-5-99
DESIGNED BY: KAE DATE 8-5-99
CHECKED BY: JCY DATE 8-5-99

PLAN PREPARED BY
VAN DELL AND ASSOCIATES, INC.
CIVIL ENGINEERS
SURVEYORS LAND PLANNERS
3701 EARTHRIGHT ROAD, IRVINE CA 92714 (714) 474-1600

UNDER THE SUPERVISION OF:
JAMIE C. YOSHIDA R.C.E. 54758 DATE

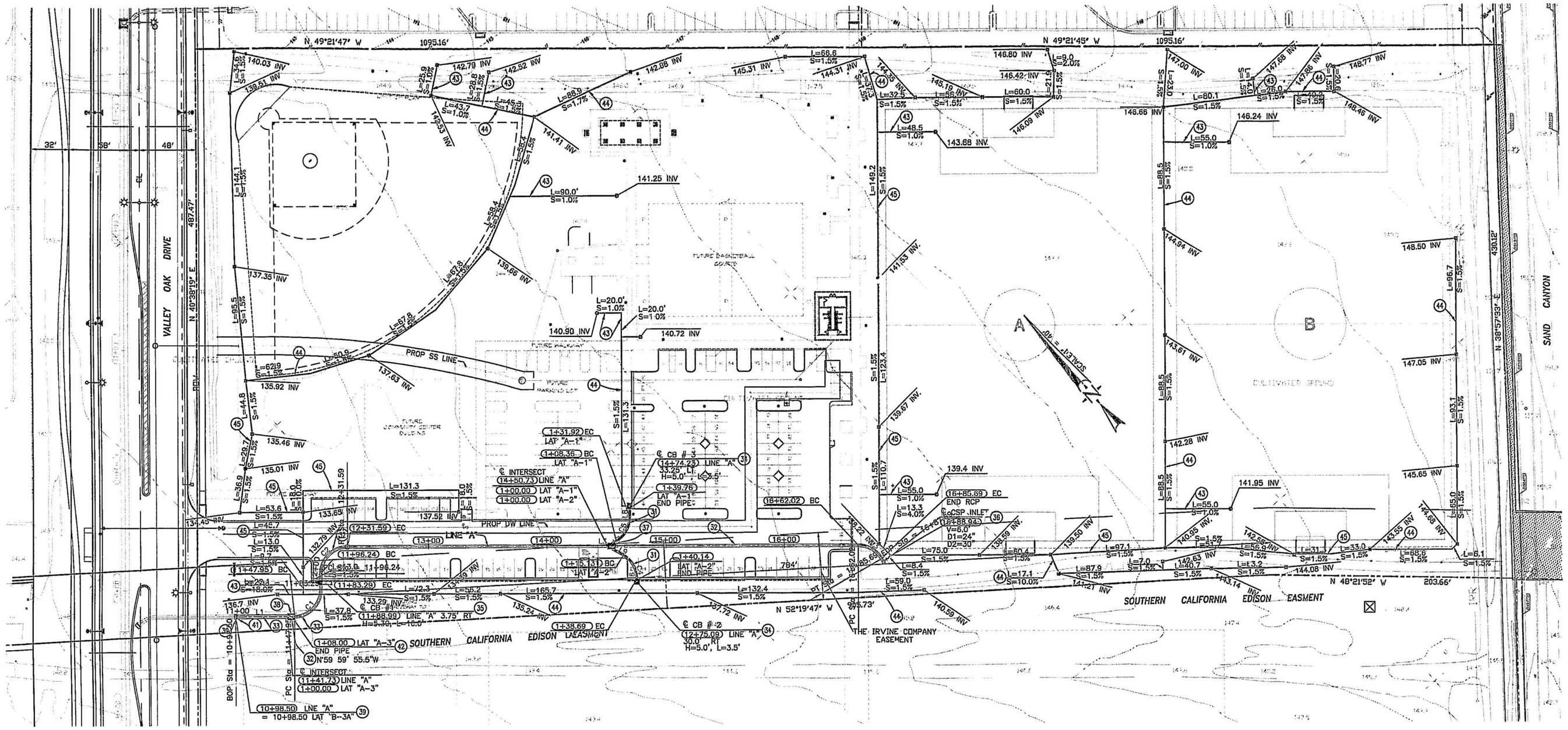
PLAN AND PROFILE STORM DRAIN IMPROVEMENT PLANS FOR:
VALLEY OAK
LINE "B" LATERALS
VTPM 97-206
CITY OF IRVINE
PUBLIC WORKS DEPARTMENT

PROJECT NO. 34071-MC
SHEET 7 OF 15

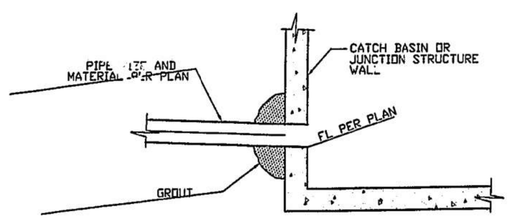
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Appendix O

Record Drawing Grading Permit No. 4319-CCG
Sheet No. CE-09 and CE-10.



STREET IMPROVEMENTS
PER COI #34071-MC



DETAIL A

NUMBER	DIRECTION	DISTANCE
L1	S 49°21'40" E	49.45 FT
L2	N 40°38'15" E	12.95 FT
L3	S 49°21'41" E	430.43 FT
L4	S 10°55'03" W	2.09 FT
L5	S 19°21'41" E	6.19 FT
L6	S 40°38'19" W	1.45 FT
L7	S 79°21'41" E	8.35 FT
L8	N 40°38'18" E	7.84 FT
L9	N 19°21'41" E	15.13 FT

NUMBER	DELTA ANGLE	TANGENT	RADIUS	ARC LENGTH
C1	90°00'05"	22.50	22.50	35.34
C2	90°00'05"	22.50	22.50	35.34
C3	59°16'43"	13.06	22.50	23.67
C4	65°00'05"	12.99	22.50	23.56
C5	60°00'05"	12.99	22.50	23.56

CONSTRUCTION NOTES:

(31) CONSTRUCT 18" RCP (D-LOAD PER PROFILE) WITH BEDDING AND BACKFILL PER CITY OF IRVINE STD. PLAN NO. 318.
(32) CONSTRUCT 24" RCP (D-LOAD PER PROFILE) WITH BEDDING AND BACKFILL PER CITY OF IRVINE STD. PLAN NO. 318.
(33) CONSTRUCT 36" RCP (D-LOAD PER PROFILE) WITH BEDDING AND BACKFILL PER CITY OF IRVINE STD. PLAN NO. 318.
(34) CONSTRUCT 3.5' CATCH BASIN TYPE I PER CITY OF IRVINE STD. PLAN NO 300.
(35) CONSTRUCT 10' CATCH BASIN TYPE II PER CITY OF IRVINE STD. PLAN NO. 301.
(36) CONSTRUCT BROOKS BOX 3636 CB OR EQUIVALENT
(37) CONSTRUCT JUNCTION STRUCTURE TYPE I PER CITY OF IRVINE STD. PLAN NO. 306.
(38) CONSTRUCT JUNCTION STRUCTURE TYPE I PER CITY OF IRVINE STD. PLAN NO. 306. WITHOUT MANHOLE SHAFT.
(39) CONSTRUCT CONCRETE COLLAR PER CITY OF IRVINE STD. PLAN NO. 310.
(40) CONSTRUCT DRAINPIPE TO CATCH BASIN/JUNCTION STRUCTURE CONNECTION PER DETAIL A .
(41) REMOVE CSP DROP INLET.
(42) CONSTRUCT BRICK AND MORTAR PLUG
(43) CONSTRUCT 4' PVC PER COI STD PLAN NO. 318.
(44) CONSTRUCT 6' PVC PER COI STD PLAN NO. 318.
(45) CONSTRUCT 8' PVC PER COI STD PLAN NO. 318.
(46) CONSTRUCT 12' PVC PER COI STD PLAN NO. 318.

AS-GRADED

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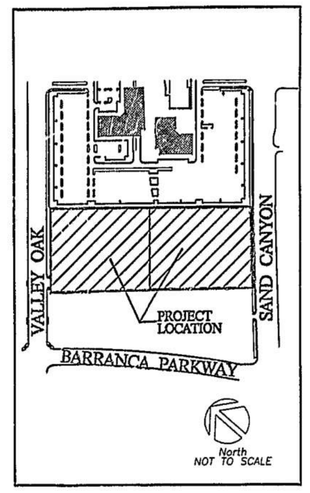
LEGEND

FG	FINISHED GRADE
FL	FLOW LINE
FS	FINISHED SURFACE
TG	TOP OF GRATE
INV	INVERT OF PIPE
TC	TOP OF CURB
HP	HIGH POINT
GB	GRADE BREAK
TW	TOP OF WALL
R/W	RIGHT OF WAY
TOP	TOP OF SLOPE
	RIGHT OF WAY/TRACT BOUNDARY
	LOT LINES
	SWALE FLOW LINE
	SLOPE
	LIMITS OF GRADING & PERMIT
	FENCE
	AREA DRAIN
	SUBSURFACE DRAIN
LA	LANDSCAPE AREA
TT	EXPLORATORY TRENCH

SEE SHEET CE-10 FOR STORM DRAIN PROFILES

PLANS PREPARED BY:
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CIVIL ENGINEERS SURVEYORS LAND PLANNERS
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UNDER THE SUPERVISION OF:
DONALD R. GORDON R.C.E.024725 DATE

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Urban Design
Environmental Analysis
Site Engineering
Graphic Design
17875 Von Karman Ave., #400
Irvine, California 92614
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IRVINE COMMUNITY DEVELOPMENT COMPANY
550 NEWPORT CENTER DRIVE
NEWPORT BEACH, CALIFORNIA 92660
TEL: (949) 720-2616 FAX: (949) 720-2285
TOM HEGGI, VICE PRESIDENT

No.	Date	Revision

REGISTERED PROFESSIONAL ENGINEER DONALD R. GORDON No. 024725 Exp.12/31/01 CIVIL STATE OF CALIFORNIA

OAKCREEK PARK

STORM DRAIN PLAN LINE "A"

PHASE ONE
LOT 259
ACCESSOR PARCEL NO. 97-206

OAKCREEK COMMUNITY PARK

DEVELOPMENT CASE NO. 47070-PA

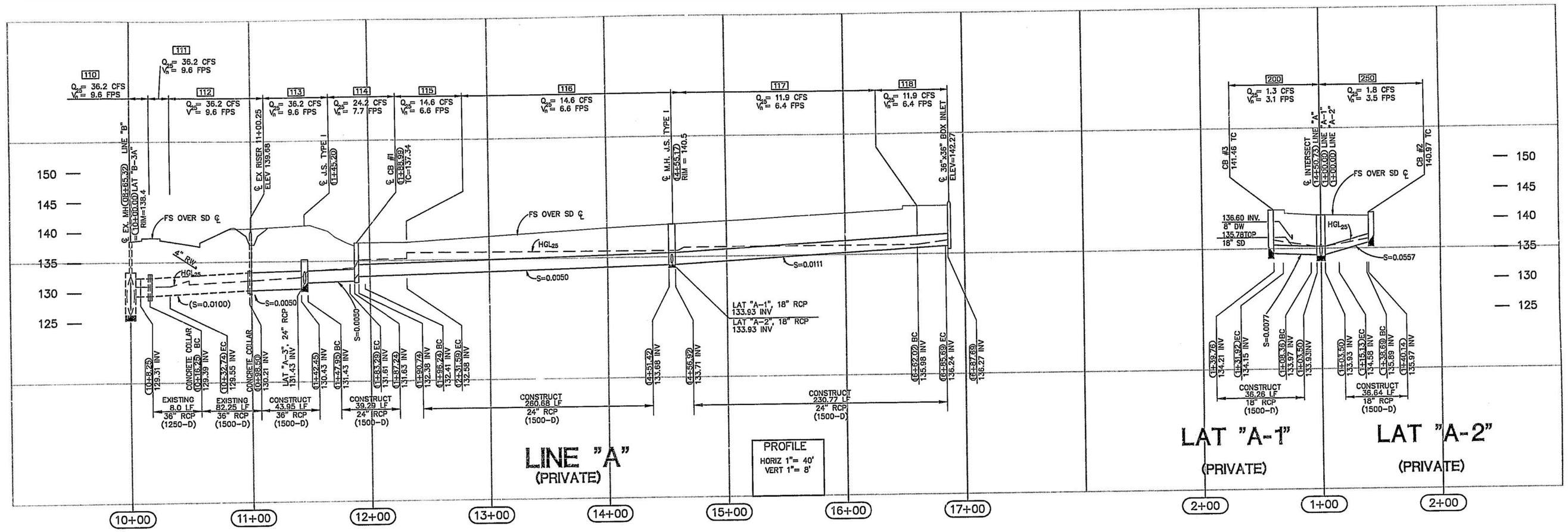
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Date:	01/10/01
Drawn By:	FM
Checked By:	DRG
Sheet No:	9 OF 13

CE-09

GRADING PERMIT NO. 4319-CCG

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SURVEYORS CIVIL ENGINEERS LAND PLANNERS
17852 DARTMOOR ROAD (714) 474-1400
IRVINE, CA 92614

UNDER THE SUPERVISION OF:

DONALD R. GORDON R.C.E.024725 DATE

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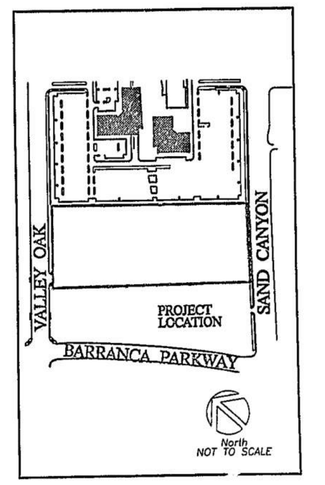
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No.	Date	Revision
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REGISTERED PROFESSIONAL ENGINEER DONALD R. GORDON No. 024725 Exp.12/31/01 STATE OF CALIFORNIA CIVIL

OAKCREEK PARK

STORM DRAIN PROFILE

DEVELOPMENTCASE NO. 47070-PA

PHASE ONE
LOT 259
ACCESSOR PARCEL NO. 97-206

OAKCREEK COMMUNITY PARK

DEVELOPMENT CASE NO. 47070-PA	
Project No:	
Scale:	1" = 40'
Date:	01/10/01
Drawn By:	JWW
Checked By:	DRG
Sheet No:	10 OF 13

CE-10

GRADING PERMIT NO. 4319-OCG

CADD File No.:

F-1218

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Appendix G Noise Background and Modeling Data

Appendix

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Fundamentals of Noise

NOISE

Noise is most often defined as unwanted sound; whether it is loud, unpleasant, unexpected, or otherwise undesirable. Although sound can be easily measured, the perception of noise and the physical response to sound complicate the analysis of its impact on people. People judge the relative magnitude of sound sensation in subjective terms such as "noisiness" or "loudness."

Noise Descriptors

The following are brief definitions of terminology used in this chapter:

- **Sound.** A disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.

- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.

- **Decibel (dB).** A unitless measure of sound, expressed on a logarithmic scale and with respect to a defined reference sound pressure. The standard reference pressure is 20 micropascals (20 μPa).

- **Vibration Decibel (VdB).** A unitless measure of vibration, expressed on a logarithmic scale and with respect to a defined reference vibration velocity. In the U.S., the standard reference velocity is 1 micro-inch per second ($1x10^{-6}$ in/sec).

- **A-Weighted Decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.

- **Equivalent Continuous Noise Level (L_{eq}); also called the Energy-Equivalent Noise Level.** The value of an equivalent, steady sound level which, in a stated time period (often over an hour) and at a stated location, has the same A-weighted sound energy as the time-varying sound. Thus, the L_{eq} metric is a single numerical value that represents the equivalent amount of variable sound energy received by a receptor over the specified duration.

- **Statistical Sound Level (L_n).** The sound level that is exceeded "n" percent of time during a given sample period. For example, the L_{50} level is the statistical indicator of the time-varying noise signal that is exceeded 50 percent of the time (during each sampling period); that is, half of the sampling time, the changing noise levels are above this value and half of the time they are below it. This is called the "median sound level." The L_{10} level, likewise, is the value that is exceeded 10 percent of the time (i.e., near the maximum) and this is often known as the "intrusive sound level." The L_{90} is the sound level exceeded 90 percent of the time and is often considered the "effective background level" or "residual noise level."

- **Maximum Sound Level (L_{max})**. The highest RMS sound level measured during the measurement period.
- **Root Mean Square Sound Level (RMS).** The square root of the average of the square of the sound pressure over the measurement period.
- **Day-Night Sound Level (L_{dn} or DNL).** The energy-average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the sound levels occurring during the period from 10:00 PM to 7:00 AM.
- **Community Noise Equivalent Level (CNEL).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added from 7:00 PM to 10:00 PM and 10 dB from 10:00 PM to 7:00 AM. NOTE: For general community/environmental noise, CNEL and L_{dn} values rarely differ by more than 1 dB (with the CNEL being only slightly more restrictive – that is, higher than the L_{dn} value). As a matter of practice, L_{dn} and CNEL values are interchangeable and are treated as equivalent in this assessment.
- **Peak Particle Velocity (PPV).** The peak rate of speed at which soil particles move (e.g., inches per second) due to ground vibration.
- **Sensitive Receptor.** Noise- and vibration-sensitive receptors include land uses where quiet environments are necessary for enjoyment and public health and safety. Residences, schools, motels and hotels, libraries, religious institutions, hospitals, and nursing homes are examples.

Characteristics of Sound

When an object vibrates, it radiates part of its energy in the form of a pressure wave. Sound is that pressure wave transmitted through the air. Technically, airborne sound is a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure that creates sound waves.

Sound can be described in terms of amplitude (loudness), frequency (pitch), or duration (time). Loudness or amplitude is measured in dB, frequency or pitch is measured in Hertz [Hz] or cycles per second, and duration or time variations is measured in seconds or minutes.

Amplitude

Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale. Because of the physical characteristics of noise transmission and perception, the relative loudness of sound does not closely match the actual amounts of sound energy. Table 1 presents the subjective effect of changes in sound pressure levels. Ambient sounds generally range from 30 dBA (very quiet) to 100 dBA (very loud). Changes of 1 to 3 dB are detectable under quiet, controlled conditions, and changes of less than 1 dB are usually not discernible (even under ideal conditions). A 3 dB change in noise levels is considered the minimum change that is detectable with human hearing in outside environments. A change of 5 dB is readily discernible to most people in an exterior environment, and a 10 dB change is perceived as a doubling (or halving) of the sound.

Table 1 Noise Perceptibility

Change in dB	Noise Level

± 3 dB	Barely perceptible increase
± 5 dB	Readily perceptible increase
± 10 dB	Twice or half as loud
± 20 dB	Four times or one-quarter as loud

Source: California Department of Transportation (Caltrans). 2013, September. Technical Noise Supplement ("TeNS").

Frequency

The human ear is not equally sensitive to all frequencies. Sound waves below 16 Hz are not heard at all, but are "felt" more as a vibration. Similarly, though people with extremely sensitive hearing can hear sounds as high as 20,000 Hz, most people cannot hear above 15,000 Hz. In all cases, hearing acuity falls off rapidly above about 10,000 Hz and below about 200 Hz.

When describing sound and its effect on a human population, A-weighted (dBA) sound levels are typically used to approximate the response of the human ear. The A-weighted noise level has been found to correlate well with people's judgments of the "noisiness" of different sounds and has been used for many years as a measure of community and industrial noise. Although the A-weighted scale and the energy-equivalent metric are commonly used to quantify the range of human response to individual events or general community sound levels, the degree of annoyance or other response also depends on several other perceptibility factors, including:

- Ambient (background) sound level
- General nature of the existing conditions (e.g., quiet rural or busy urban)
- Difference between the magnitude of the sound event level and the ambient condition
- Duration of the sound event
- Number of event occurrences and their repetitiveness
- Time of day that the event occurs

Duration

Time variation in noise exposure is typically expressed in terms of a steady-state energy level equal to the energy content of the time varying period (called L_{eq}), or alternately, as a statistical description of the sound level that is exceeded over some fraction of a given observation period. For example, the L_{50} noise level represents the noise level that is exceeded 50 percent of the time; half the time the noise level exceeds this level and half the time the noise level is less than this level. This level is also representative of the level that is exceeded 30 minutes in an hour. Similarly, the L_2, L_8 and L_{25} values represent the noise levels that are exceeded 2, 8, and 25 percent of the time or 1, 5, and 15 minutes per hour, respectively. These "n" values are typically used to demonstrate compliance for stationary noise sources with many cities' noise ordinances. Other values typically noted during a noise survey are the L_{min} and L_{max}. These values represent the minimum and maximum root-mean-square noise levels obtained over the measurement period, respectively.

Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law and many local jurisdictions use an adjusted 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL) or Day-Night Noise Level (L_{dn}). The CNEL descriptor requires that an artificial increment (or "penalty") of 5 dBA be added to the actual noise level for the hours from 7:00 PM to 10:00 PM and 10 dBA for the hours from 10:00 PM to 7:00 AM. The L_{dn} descriptor uses the same methodology

except that there is no artificial increment added to the hours between 7:00 PM and 10:00 PM. Both descriptors give roughly the same 24-hour level, with the CNEL being only slightly more restrictive (i.e., higher). The CNEL or L_{dn} metrics are commonly applied to the assessment of roadway and airport-related noise sources.

Sound Propagation

Sound dissipates exponentially with distance from the noise source. This phenomenon is known as "spreading loss." For a single-point source, sound levels decrease by approximately 6 dB for each doubling of distance from the source (conservatively neglecting ground attenuation effects, air absorption factors, and barrier shielding). For example, if a backhoe at 50 feet generates 84 dBA, at 100 feet the noise level would be 79 dBA, and at 200 feet it would be 73 dBA. This drop-off rate is appropriate for noise generated by on-site operations from stationary equipment or activity at a project site. If noise is produced by a line source, such as highway traffic, the sound decreases by 3 dB for each doubling of distance over a reflective ("hard site") surface such as concrete or asphalt. Line source noise in a relatively flat environment with ground-level absorptive vegetation decreases by an additional 1.5 dB for each doubling of distance.

Psychological and Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and the nervous system. Extended periods of noise exposure above 90 dBA results in permanent cell damage, which is the main driver for employee hearing protection regulations in the workplace. For community environments, the ambient or background noise problem is widespread, through generally worse in urban areas than in outlying, less-developed areas. Elevated ambient noise levels can result in noise interference (e.g., speech interruption/masking, sleep disturbance, disturbance of concentration) and cause annoyance. Since most people do not routinely work with decibels or A-weighted sound levels, it is often difficult to appreciate what a given sound pressure level number means. To help relate noise level values to common experience, Table 2 shows typical noise levels from familiar sources.

Table 2 Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Onset of physical discomfort	120+	
	110	Rock Band (near amplification system)
Jet Flyover at 1,000 feet		
	100	
Gas Lawn Mower at three feet		
	90	
Diesel Truck at 50 feet, at 50 mph		Food Blender at 3 feet
	80	Garbage Disposal at 3 feet
Noisy Urban Area, Daytime		
	70	Vacuum Cleaner at 10 feet
Commercial Area		Normal speech at 3 feet
Heavy Traffic at 300 feet	60	
		Large Business Office
Quiet Urban Daytime	50	Dishwasher Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (background)
Quiet Suburban Nighttime		
	30	Library
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (background)
	20	
		Broadcast/Recording Studio
	10	
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

Source: California Department of Transportation (Caltrans). 2013, September. Technical Noise Supplement ("TeNS").

Vibration Fundamentals

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration is normally associated with activities stemming from operations of railroads or vibration-intensive stationary sources, but can also be associated with construction equipment such as jackhammers, pile drivers, and hydraulic hammers. As with noise, vibration can be described by both its amplitude and frequency. Vibration displacement is the distance that a point on a surface moves away from its original static position; velocity is the instantaneous speed that a point on a surface moves; and acceleration is the rate of change of the speed. Each of these descriptors can be used to correlate vibration to human response, building damage, and acceptable equipment vibration levels. During construction, the operation of construction equipment can cause groundborne vibration. During the operational phase of a project, receptors may be subject to levels of vibration that can cause annoyance due to noise generated from vibration of a structure or items within a structure.

Vibration amplitudes are usually described in terms of either the peak particle velocity (PPV) or the root mean square (RMS) velocity. PPV is the maximum instantaneous peak of the vibration signal and RMS is the

square root of the average of the squared amplitude of the signal. PPV is more appropriate for evaluating potential building damage and RMS is typically more suitable for evaluating human response.

As with airborne sound, annoyance with vibrational energy is a subjective measure, depending on the level of activity and the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Persons accustomed to elevated ambient vibration levels, such as in an urban environment, may tolerate higher vibration levels. Table 3 displays the human response and the effects on buildings resulting from continuous vibration (in terms of various levels of PPV).

Table 3 Human Reaction to Typical Vibration Levels

Vibration Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.006–0.019	Threshold of perception, possibility of intrusion	Vibrations unlikely to cause damage of any type
0.08	Vibrations readily perceptible	Recommended upper level of vibration to which ruins and ancient monuments should be subjected
0.10	Level at which continuous vibration begins to annoy people	Virtually no risk of "architectural" (i.e. not structural) damage to normal buildings
0.20	Vibrations annoying to people in buildings	Threshold at which there is a risk to "architectural" damage to normal dwelling – houses with plastered walls and ceilings
0.4–0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage

Source: California Department of Transportation (Caltrans). 2020, April. *Transportation and Construction Vibration Guidance Manual*. Prepared by ICF International.

LOCAL REGULATIONS AND STANDARDS

CHAPTER 2. - NOISE

Footnotes:
*--- (**8**) ---*
***Editor's note—** Prior to amendment by Ord. No. 84-18, adopted Sept. 11, 1984, the provisions of this chapter derived from Ord. No. 136, §§ 2—13, adopted March 25, 1975.*

Sec. 6-8-201. - Declaration of policy.

The City Council has adopted the following regulations in order to control unnecessary, excessive and annoying noise in the City of Irvine. The provisions of this chapter are applicable to nontransportation-related stationary noise sources.

(Code 1976, § VI.K-301; Ord. No. 84-18, 9-11-84)

Sec. 6-8-202. - Definitions.

The following definitions are provided to clarify words, phrases and terms used in this chapter.

Ambient noise level: The all-encompassing noise level associated with a given environment, being a composite of sounds from all sources, excluding the alleged offensive noise, at the location and approximate time at which a comparison with the alleged offensive noise is to be made.

Cumulative period: An additive period of time composed of individual time segments which may be continuous or interrupted.

Decibel (dB): A unit of noise measurement indicating the loudness of sound, based on logarithmic (base 10) scale.

Emergency work: Any mechanical device, apparatus or equipment which is used, employed or performed in an effort to protect, provide or restore safe conditions in the community or for the citizenry, or work by private or public utilities when restoring utility service.

Grading: Any excavating or filling of earth material or any combination thereof conducted to prepare a site for construction or the placement of the improvements thereon.

Impact noises: The noise produced by the collision of one mass in motion with a second mass which may be either in motion or at rest.

Noise level: The "A" weighted sound pressure level in decibels obtained by using a sound level meter. The "A" weighted discriminates against the lower and higher frequencies according to a relationship with the sensitivity of the human ear. The unit of measurement is designated as dB(A).

Predominant tone noise: A noise characterized by a predominant frequency or frequencies so that other frequencies cannot be readily distinguished.

Stationary noise source: The source which is often referred to as "fixed source" (non-transportation-related) including, but not limited to, mechanical electric equipment, various power tools, construction, commercial, industrial and agricultural activity and animal noise.

(Code 1976, § VI.K-302; Ord. No. 84-18, 9-11-84)

Sec. 6-8-203. - Noise level measurement criteria.

Any noise level measurements made pursuant to the provisions of this chapter shall be performed using a sound level meter. The location selected for measuring exterior noise levels shall be anywhere on the affected property. The interior noise measurement shall be made at a point in the affected unit at least four feet from the wall, ceiling or floor nearest the noise source.

(Code 1976, § VI.K-303; Ord. No. 84-18, 9-11-84)

Sec. 6-8-204. - General provision.

A. *Designated noise zones.* The properties hereinafter described, whether within or without the City, are hereby assigned to the following noise zones:

1. *Noise zone 1:* All hospitals, libraries, churches, schools and residential properties.
2. *Noise zone 2:* All professional office and public institutional properties.
3. *Noise zone 3:* All commercial properties excluding professional office properties.
4. *Noise zone 4:* All industrial properties.

B. *Exterior and interior noise standards.*

1. The following noise standards, unless otherwise specifically indicated, shall apply to all property within a designated noise zone.

NOISE STANDARDS

dB(A)

Noise Levels for a Period Not Exceeding (minutes/hour)

	Noise Zone	Time Period	30	15	5	1	0 (anytime)
1	Exterior	7:00 a.m.—10:00 p.m.	55	60	65 [1]	70	75
		10:00 p.m.—7:00 a.m.	50	55	60	65 [1]	70
	Interior	7:00 a.m.—10:00 p.m.	—	—	55	60	65
		10:00 p.m.—7:00 a.m.	—	—	45	50	55
2	Exterior	Any time	55	60	65	70	75
	Interior	Any time	—	—	55	60	65
3	Exterior	Any time	60	65	70	75	80
	Interior	Any time	—	—	55	60	65
4	Exterior	Any time	70	75	80	85	90
	Interior	Any time	—	—	55	60	65

1. This standard does not apply to multifamily residence private balconies. Multifamily developments with balconies that do not meet the 65 CNEL are required to provide occupancy disclosure notices to all future tenants regarding potential noise impacts.
2. It shall be unlawful for any person at any location within the City to create any noise or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the noise level when measured on any property within designated noise zones either within or without the City to exceed the applicable noise standard.
3. Each of the noise standards specified above shall be reduced by five dB(A) for impact, or predominant tone

noise or for noises consisting of speech or music.

4. In the event that the noise source and the affected property are within different noise zones, the noise standards of the affected property shall apply.

(Code 1976, § VI.K-304; Ord. No. 84-18, 9-11-84; Ord. No. 05-06, § 2, 2-22-05)

Sec. 6-8-205. - Special provisions.

A. Construction activities and agricultural operations may occur between 7:00 a.m. and 7:00 p.m. Mondays through Fridays, and 9:00 a.m. and 6:00 p.m. on Saturdays. No construction activities shall be permitted outside of these hours or on Sundays and federal holidays, except Columbus Day, unless a temporary waiver is granted by the Chief Building Official or his or her authorized representative. Trucks, vehicles, and equipment that are making or are involved with material deliveries, loading, or transfer of materials, equipment service, maintenance of any devices or appurtenances for or within any construction project in the City shall not be operated or driven on City streets outside of these hours or on Sundays and federal holidays unless a temporary waiver is granted by the City. Any waiver granted shall take impact upon the community into consideration. No construction activity and agricultural operations will be permitted outside of these hours except in emergencies including maintenance work on the City rights-of-way that might be required.

Deliveries to or pickups from any commercial property sharing a property line with any residential property may occur between 7:00 a.m. and 10:00 p.m. daily. No deliveries to or pickups from any such properties shall occur outside of these hours.

B. Maintenance of real property operations may exceed the noise standards between 7:00 a.m. and 7:00 p.m. on any day except Sundays, or between 9:00 a.m. and 6:00 p.m. on Sundays or a federal holiday.

C. The use of leaf blowers shall be regulated as follows:

1. *Definition of leaf blower.* Leaf blowers are defined as portable power equipment that is powered by fuel or electricity and used in any landscape maintenance, construction, property repair, or property maintenance for the purpose of blowing, dispersing or redistributing dust, dirt, leaves, grass clippings, cuttings and trimmings from trees and shrubs or other debris.

2. *Limitations on use.*

a. All leaf blowers shall be equipped with a permanently installed limiter that restricts the individual equipment motor performance to half throttle speed or less, and will produce not more than 70 decibels dB(A) measured at the midpoint of a wall area 20 feet long and 10 feet high and at a horizontal distance 50 feet away from the midpoint of the wall, or not more than 76 dB(A) at a horizontal distance of 25 feet using a sound level meter set at level A.

b. Each individual leaf blower shall be tested and certified for use by the City of Irvine or its designated representative. Each individual leaf blower shall bear the label of required approval in a visible location on the equipment prior to use and at all times during use. A fee for the City to recover all costs connected with equipment approvals shall be charged in an amount set by City resolution.

c. The use of leaf blowers is prohibited except between the hours of 8:00 a.m. and 5:00 p.m. Monday through Friday and between 9:00 a.m. and 5:00 p.m. on Saturday.

d. Leaf blower operations shall not cause dirt, dust, debris, leaves, grass clippings, cuttings or trimmings from trees or shrubs to be blown or deposited on any adjacent or other parcel of land, lot, or public right-of-way/property other than the parcel, land, or lot upon which the leaf blower is being operated. Deposits of

dirt, dust, leaves, grass clippings, debris, cuttings or trimmings from trees or shrubs shall be removed and disposed of in a sanitary manner which will prevent dispersement by wind, vandalism or similar means within six hours of deposit by the user or property occupant.

e. Leaf blowers shall not be operated within a horizontal distance of 10 feet of any operable window, door, or mechanical air intake opening or duct.

f. No person using leaf blowers shall exceed noise limitations set by Section 6-8-204 of the City Code of Ordinances.

3. *Education.*

a. Each person operating an individual leaf blower is required to complete not less than one training session of content and time approved by the City of Irvine Administrative Authority prior to operation of leaf blower equipment. Training and qualification shall be required for certification at least every two years for each individual equipment user.

b. The equipment operator shall carry certification of the training and qualification at all times during equipment use and make it available upon demand. Failure to abide by the use requirements contained in this Code and/or the certification training provided will be cause for the City of Irvine to revoke such certification.

c. *Exception:* An individual residential property occupant operating a single leaf blower himself or herself in a manner confined to his or her own property shall be excepted from the education requirements set forth by this subsection.

4. *Fees.* A fee for the City to recover all costs connected with training, testing, certification and enforcement shall be charged in an amount established by resolution of the City Council, which may be amended from time-to-time.

D. The following activities shall be exempted from the provision of this chapter:

1. School bands, school athletic and school entertainment events, provided said events are conducted on school property or authorized by special permit from the City.

2. Activities otherwise lawfully conducted on public parks, public playgrounds and public or private school grounds.

3. Any mechanical device, apparatus or equipment which is utilized for emergency work, pest control, and protection or harvest of agricultural crops during periods of potential or actual frost damage or other adverse weather conditions.

4. Any activity or equipment to the extent that design regulation thereby has been preempted by State or federal law.

The Chief Building Official or his or her duly authorized representative and City police shall enforce where necessary the provisions of this chapter. No person shall interfere with, oppose or resist any authorized person charged with the enforcement of this chapter when such person is engaged in the performance of his or her duty.

(Code 1976, § VI.K-305; Ord. No. 84-18, 9-11-84; Ord. No. 88-11, §§ 1, 2, 5-24-88; Ord. No. 90-2, § 1, 2-13-90; Ord. No. 90-7, § 1, 4-10-90; Ord. No. 05-16, § 2, 7-12-05)

Sec. 6-8-206. - Reserved.

Sec. 6-8-207. - Enforcement.

The Chief Building Official or his or her duly authorized representative shall enforce the provisions of this chapter. No person shall interfere with, oppose or resist any authorized person charged with the enforcement of this chapter while such person is engaged in the performance of his or her duty.

(Code 1976, § VI.K-306; Ord. No. 84-18, 9-11-84)

Sec. 6-8-208. - Waiver procedure.

A. The owner or operator of a noise source which violates any of the provisions of this chapter may apply for temporary waiver with the Chief Building Official. Any waiver granted shall take impact upon the community into consideration and state why immediate compliance cannot be achieved, a proposed method of achieving compliance, and a proposed time schedule for its accomplishment. Said application shall be accompanied by a fee as listed in the City Council resolution for variances where deemed appropriate and necessary by the City administrative authority.

B. A separate application shall be filed for each noise source; provided, however, that several sources under common ownership or several sources on a single property may be combined into one application.

C. An applicant for a waiver shall remain subject to prosecution under the terms of this chapter until a waiver is granted.

D. Within 60 days of receipt of an appeal, the City Council shall either affirm, modify or reverse the decision of the Chief Building Official at a duly notified public hearing.

(Code 1976, § VI.K-307; Ord. No. 84-18, 9-11-84; Ord. No. 90-7, § 2, 4-10-90)

Sec. 6-8-209. - Appeals.

A. The decision of the Chief Building Official on waiver applications may be appealed to the City Council. Appeals shall be filed with the City Clerk and shall be accompanied by a letter stating the reason for the appeal.

B. An appeal shall be accompanied by a deposit/fee as established by resolution, which shall be on an annual basis by City Council resolution.

C. An appeal shall be filed within 15 days of the decision of the Chief Building Official.

D. Within 60 days of receipt of an appeal, the City Council shall either affirm, modify or reverse the decision of the Chief Building Official at a duly notified public hearing.

(Code 1976, § VI.K-308; Ord. No. 84-18, 9-11-84)

CONSTRUCTION NOISE MODELING

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/29/2021
Case Description: COI-56

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Asphalt Demolition	Residential	55.0	50.0	45.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Concrete Saw	No	20	89.6	50.0		0.0
Excavator	No	40	80.7	50.0		0.0
Dozer	No	40	81.7	50.0		0.0

Results

	Calculated (dBA)		Noise Limits (dBA)				Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Concrete Saw	89.6	82.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	89.6	84.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/29/2021
Case Description: COI-56

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Site Prep	Residential	55.0	50.0	45.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	50.0	0.0
Tractor	No	40	84.0		50.0	0.0
Tractor	No	40	84.0		50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)				Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer	81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	84.0	84.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/29/2021
Case Description: COI-56

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Rough Grading	Residential	55.0	50.0	45.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Grader	No	40	85.0		50.0	0.0
Scraper	No	40	83.6		50.0	0.0
Tractor	No	40	84.0		50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)				Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Grader	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	83.6	79.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	85.0	85.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/29/2021
Case Description: COI-56

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Utility Trenching	Residential	55.0	50.0	45.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Excavator	No	40	80.7	50.0	0.0	

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator	80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/29/2021
Case Description: COI-56

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Fine Grading	Residential	55.0	50.0	45.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Grader	No	40	85.0		50.0	0.0
Scraper	No	40	83.6		50.0	0.0
Tractor	No	40	84.0		50.0	0.0

Results

	Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
	Calculated (dBA)		Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Grader	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	83.6	79.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	85.0	85.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/29/2021
Case Description: COI-56

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Asphalt Paving	Residential	55.0	50.0	45.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Paver	No	50	77.2	50.0	0.0	
Pavement Scarafier	No	20	89.5	50.0	0.0	
Roller	No	20	80.0	50.0	0.0	

Results

	Calculated (dBA)		Noise Limits (dBA)				Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Paver	77.2	74.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pavement Scarafier	89.5	82.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	80.0	73.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	89.5	83.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/29/2021
Case Description: COI-56

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Light Pole Installation	Residential	55.0	50.0	45.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Crane	No	16	80.6	50.0	0.0	
Auger Drill Rig	No	20	84.4	50.0	0.0	

Results

	Calculated (dBA)		Noise Limits (dBA)				Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening	
Night												
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Lmax	Leq											
Crane	80.6	72.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A												
Auger Drill Rig	84.4	77.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A												
Total	84.4	78.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A												

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/29/2021
Case Description: COI-56

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Finish/Landscaping	Residential	55.0	50.0	45.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Excavator	No	40	80.7	50.0	0.0	

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator	80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/29/2021
Case Description: COI-56

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Architectural Coating	Residential	55.0	50.0	45.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Compressor (air)	77.7	73.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	77.7	73.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

COI-56 Construction Noise Modeling Attenuation Calculations

Levels in dBA Leq

Phase	RCNM Reference Noise Level	Residences to northwest	Residences to southwest	Valley Oak Park to southwest	
Distance in feet	*50*	*270*	*675*	*740*	
Asphalt Demolition	85	70	62	61	
Distance in feet	*50*	*140*	*340*	*370*	
Utility Trenching	77	68	60	59	
Finish/Landscaping	77	68	60	59	
Distance in feet	*50*	*620*	*530*	*740*	
Rough Grading	85	63	64	62	
Fine Grading	85	63	64	62	
Site Preperation	84	62	64	61	
Distance in feet	*50*	*730*	*625*	*900*	
Architectural Coating	74	50	52	49	
Asphalt Paving	84	60	62	58	
Distance in feet	*50*	*170*	*720*	*750*	
Light Pole Installation	77	67	54	54	

Attenuation calculated through Inverse Square Law: Lp(R2) = Lp(R1) - 20Log(R2/R1)

COI-56 Vibration Annoyance Attenuation Calculations

Levels in VdB

Equipment	**Vibration @ 25 ft**	**Residential to northwest**	**Residential to southwest**
Distance in feet		*160*	*270*
Vibratory Roller	94	70	63
Hoe Ram	87	63	56
Large Bulldozer	87	63	56
Caisson Drilling	87	63	56
Loaded Trucks	86	62	55
Jackhammer	79	55	48
Small Bulldozer	58	34	27
Clam shovel	94	70	63

COI-56 Vibration Annoyance Attenuation Calculations

		Levels in in/sec PPV	
	Vibration Reference Level	**Residential to northwest**	**Residential to southwest**
Distance in feet	**at *25 feet***	*160*	*270*
Vibratory Roller	0.21	0.013	0.006
Hoe Ram	0.089	0.005	0.003
Large Bulldozer	0.089	0.005	0.003
Caisson Drilling	0.089	0.005	0.003
Loaded Trucks	0.076	0.005	0.002
Jackhammer	0.035	0.002	0.001
Small Bulldozer	0.003	0.000	0.000
Clam shovel	0.202	0.012	0.006

OPPERATIONAL NOISE MODELING

COI-56.0

Traffic Noise Calculations

	ADT Volumes*				dBA CNEL Increae		
Roadway Segment	Existing No Project	Existing Plus Project	Future No Project	Future Plus Project	Project Noise Increase	Cumulative Increase	Project Cumulative Contribution
Valley Oak Drive = south of Irvine Center Drive	4,200	4,517	8,100	8,417	0.3	3.0	0.2
Barranca Parkway west of Valley Oak Drive	11,500	11,817	15,400	15,717	0.1	1.4	0.1
Barranca Parkway - Valley Oak Drive to Sand Canyon A	13,700	14,017	18,200	18,517	0.1	1.3	0.1
Barranca Parkway - Sand Canyon Avenue to Laguna Ca	12,000	12,317	19,200	19,517	0.1	2.1	0.1

* Existing No Project and Buildout No Project daily volumes provided by the City of Irvine.

COI-56 - Stationary Noise Attenuation Calculatic

	Reference Levels, Distances, and
	Soccer Fields
Reference Distance in feet	*15*
Reference Levels, dBA Leq	60
Distance and Direction to	200 NW
Distance Only	200

	Soccer Fields
	Attenuated Noise Levels
Attenuated Levels at Receptors	37

Attenuation calculated through Inverse Square Law: Lp(R2) = Lp(R

Normalized Levels and Distances

	Soccer
	59.8
Reference Distance	**15**
Normalized Distance	*50*
Normalized Level dBA Leq	*49*

Appendix H Access and Circulation Considerations

Appendix

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URBAN CROSSROADS

urbanxroads.com

June 8, 2021

Mr. Chris Tiffany
Schmidt Design Group
1310 Rosecrans Street, Suite G
San Diego, CA 92106

SUBJECT: OAK CREEK PARK ACCESS AND CIRCULATION CONSIDERATIONS

Dear Mr. Chris Tiffany:

This letter provides our initial review of traffic issues associated with proposed improvements for the Oak Creek Community Park, including an assessment of alternative access configurations. The simulation and optimization traffic modeling tools Synchro and SimTraffic have also been utilized to evaluate existing plus proposed project traffic flows at the Valley Oak Drive / Oak Creek Park intersection.

PROJECT CONTEXT

Exhibit 1 shows the existing park, which is located north of Barranca Parkway, west of Sand Canyon Avenue, and east of Valley Oak Drive in the City of Irvine. Access to the park is provided at the Valley Oak Drive / Oak Creek Park intersection. Park visitors traveling south on Valley Oak Drive use a left turn pocket to turn into the site. Northbound Park visitors turn right at the Valley Oak Drive / Oak Creek Park intersection to enter the site, after maneuvering through the Valley Oak Drive / Barranca Parkway traffic signal.

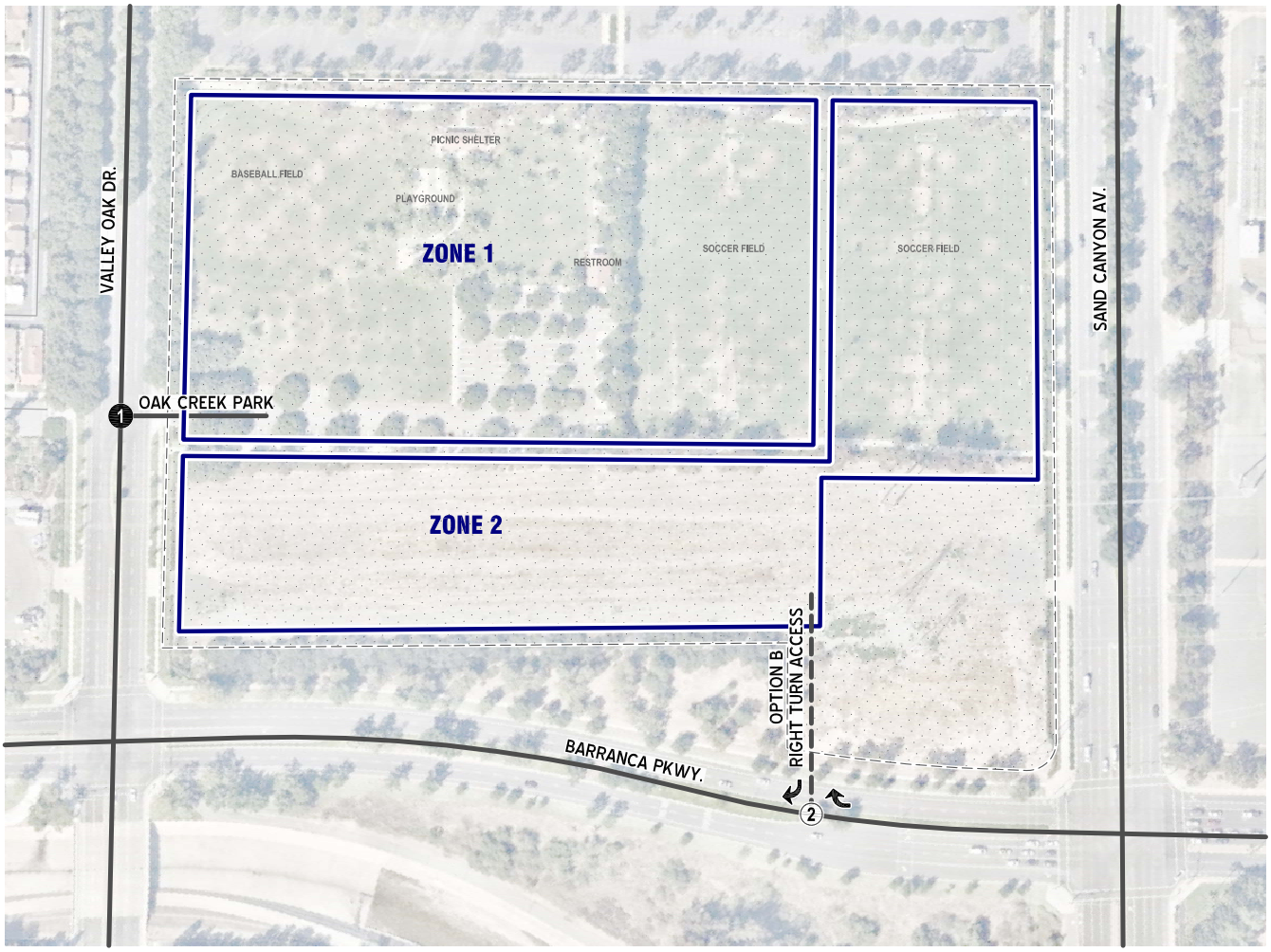
The Park currently provides 116 public parking spaces. Existing Oak Creek Park facilities include two soccer fields, one baseball field, and other multi-use active park accommodations (child play areas, restrooms, picnic pavilion, turf areas for various play/sports uses, and pedestrian walkways).

Exhibit 2 shows the City of Irvine General Plan roadway classifications and operational characteristics for streets surrounding the Park. The roadway system in the City of Irvine consists of four highway classifications: Major, Primary, Secondary and Commuter, which accommodate the majority of intercity and intracity trips. Additionally, there are three street classifications, Local Collector, Local Street and Private Way, which provide access to the highways.

Valley Oak Drive is classified as a Primary (two lanes in each direction, divided by a median), although it functions as a Collector between Alton Parkway and Irvine Center Drive. A Primary is defined as a moderate-speed highway with restricted access, which abuts and distributes trips to a variety of land uses. Oak Valley Drive is designed to provide four lanes of through traffic, bicycle lanes and emergency parking only, and it accommodates moderate parallel and perpendicular pedestrian movements.

Exhibit 3 shows available existing traffic volumes on streets surrounding the Park. Valley Oak Drive currently serves approximately 4,100 vehicles per day adjacent to the site.

EXHIBIT 1: EXISTING SITE AREA

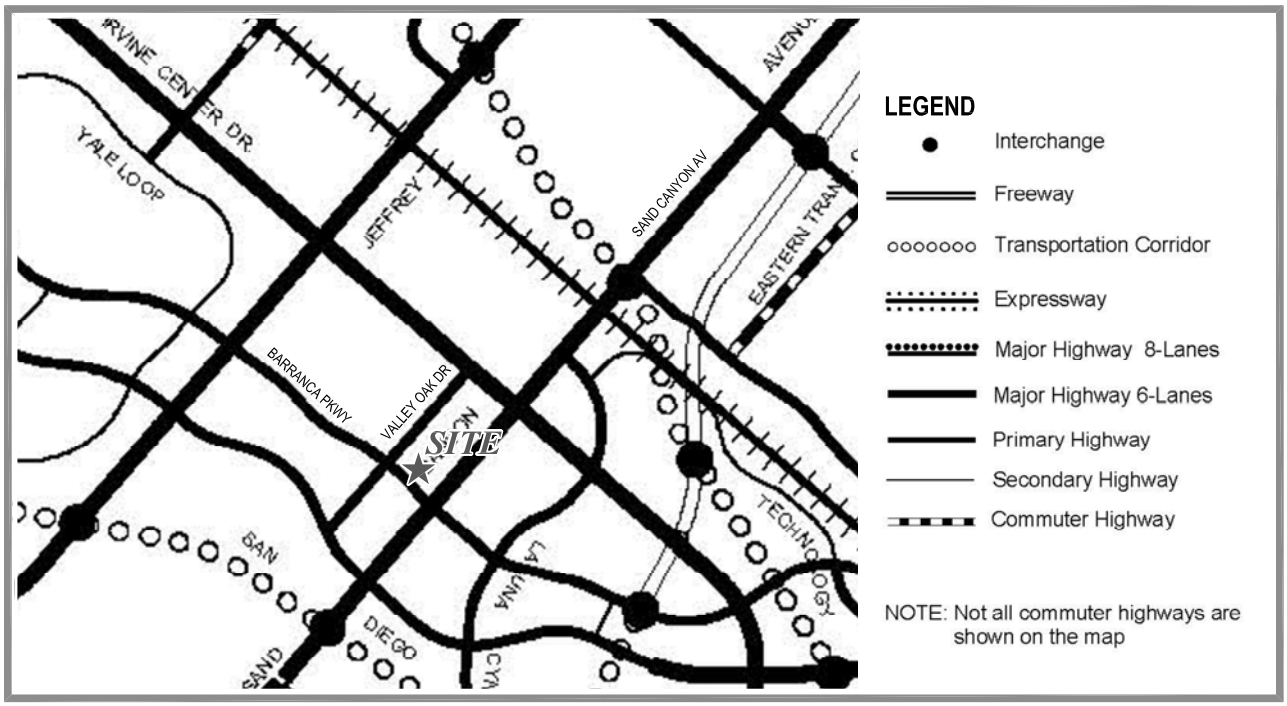


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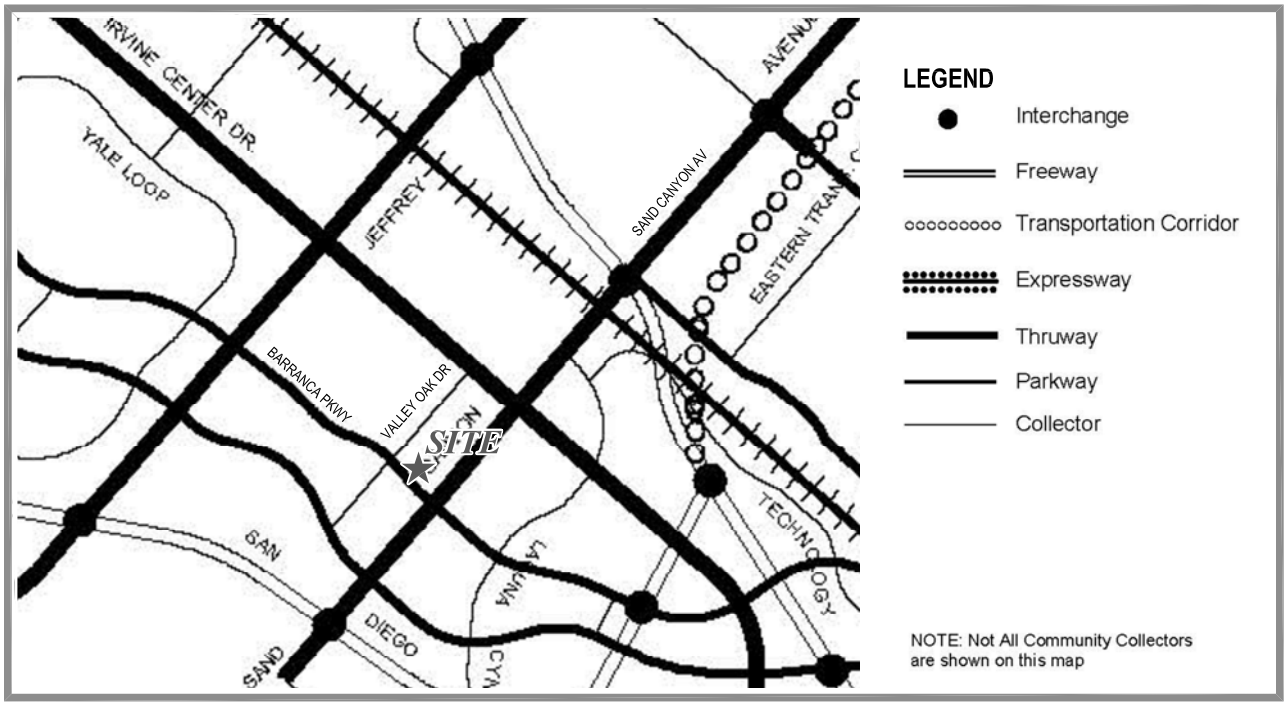
- 1 = OPTION A EXISTING ANALYSIS LOCATION
- 2 = OPTION B ADDITIONAL ANALYSIS LOCATION
- = OPTION B DRIVEWAY (FUTURE)
- = RIGHT-IN/RIGHT-OUT ONLY
- ZONE # = TRAFFIC ANALYSIS ZONE (TAZ)

EXHIBIT 2: CITY OF IRVINE GENERAL PLAN ROADWAY CLASSIFICATION AND OPERATIONAL CHARACTERISTICS

ROADWAY CLASSIFICATION

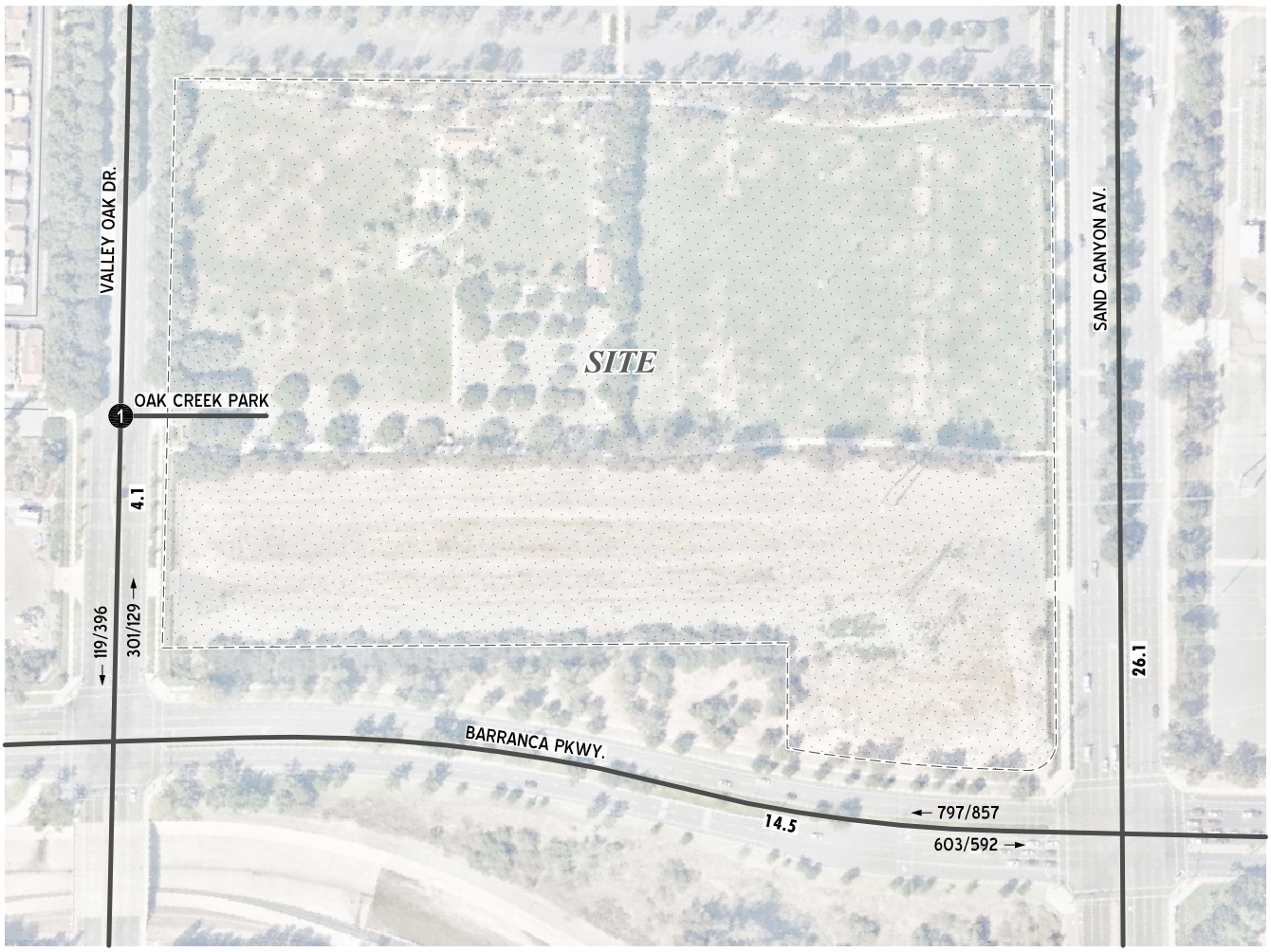


OPERATIONAL CHARACTERISTICS



N

EXHIBIT 3: AVAILABLE EXISTING WEEKDAY TRAFFIC VOLUMES



LEGEND:

- (#) = INTERSECTION ID
- 10.0 = VEHICLES PER DAY (1000'S)
- ←100 = AM/PM DIRECTIONAL PEAK HOUR VOLUME

COUNT SOURCES:

1.) VALLEY OAK DRIVE ADT AND PEAK HOUR DIRECTIONAL FLOW: 2-DAY 24-HR COUNT (OCT. 9 to 10, 2018)

2.) SAND CANYON AV. ADT: 2-DAY ADT AVERAGE FROM CITY OF IRVINE COUNT DATA (2019)

3.) BARRANCA PKWY ADT: ESTIMATED BASED ON THE OCT. 2019 PEAK HOUR VOLUMES

4.) BARRANCA PKWY. PEAK HOUR DIRECTIONAL FLOW COUNT DATE: OCTOBER 15, 2019

As shown on the image below, pedestrians are directed to use the Valley Oak Drive / Barranca Parkway traffic signal crosswalk to cross Valley Oak Drive near the Park entrance.



Exhibits 4 and 5 show two access options for proposed Park land uses. Proposed Park land use quantities do not vary between the alternative access configurations. Proposed Park improvements expand the on-site public parking spaces from 116 (existing) to 229 total spaces (future). Proposed facilities include a new two-acre dog park and multi-use turf area, in addition to two soccer fields and other existing multi-use active park accommodations (child play areas, restrooms, picnic pavilion, turf areas for various play/sports uses, and pedestrian walkways).

Option A (Exhibit 4) retains the existing Valley Oak Drive / Oak Creek Park intersection as the only public vehicle entrance to the site. Option B (Exhibit 5) adds a limited access driveway (right turns only/no median break) to Barranca Parkway west of Sand Canyon Avenue.

TRIP GENERATION

Trip generation represents the amount of vehicle traffic that is attracted and produced by a development and is based upon the specific land uses planned for a given project.

EXHIBIT 4: OPTION A SITE PLAN

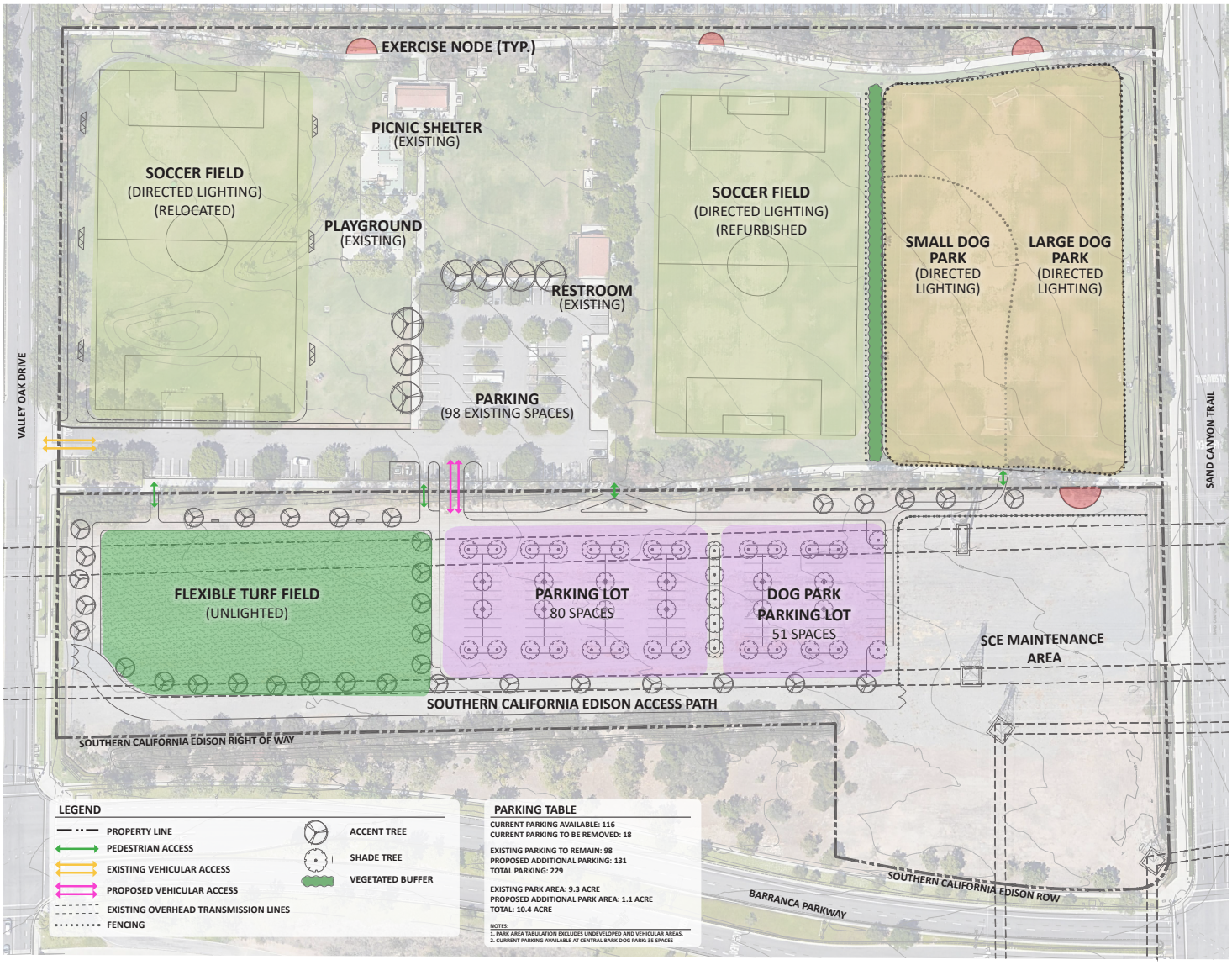
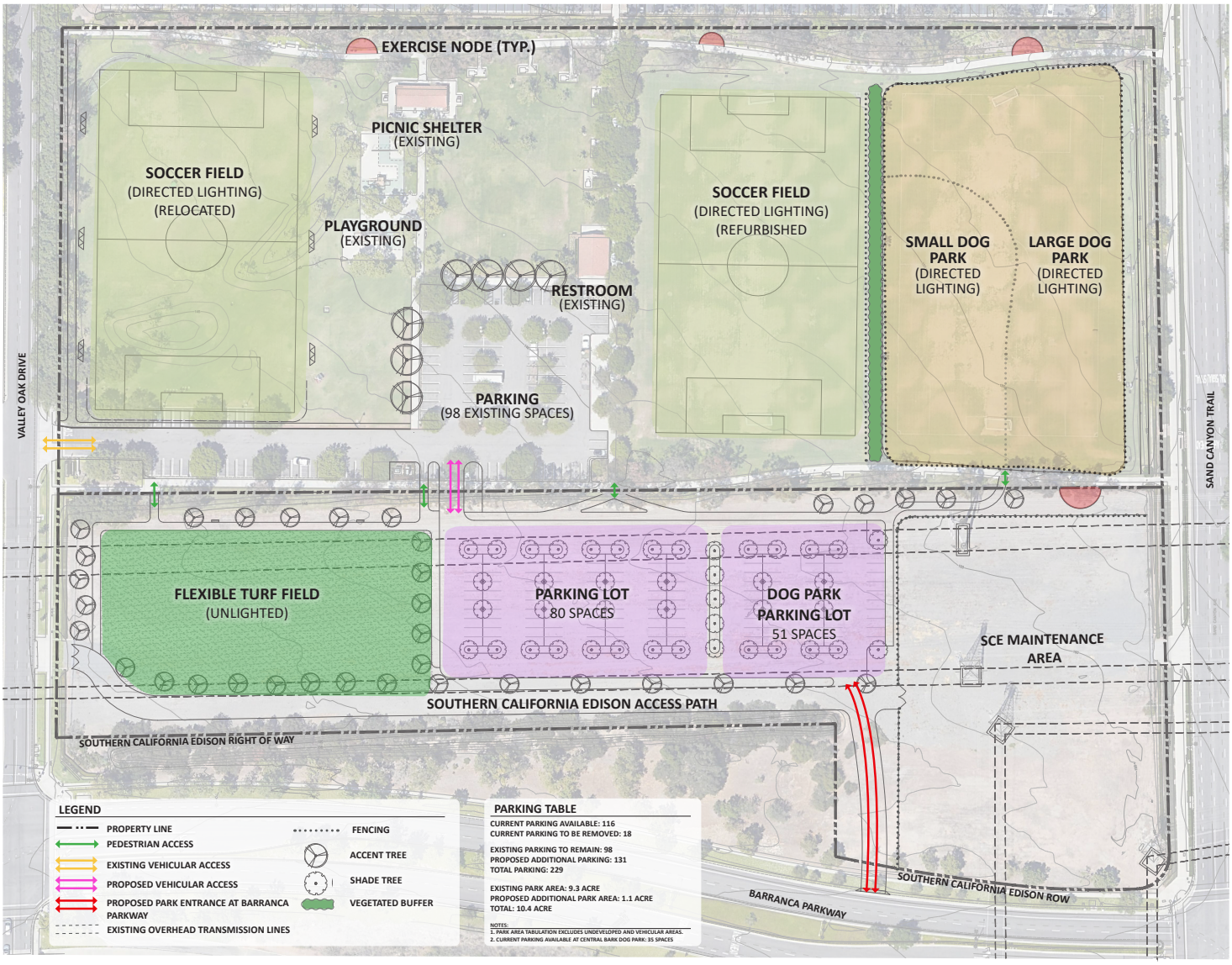


EXHIBIT 5: OPTION B SITE PLAN



The weekday trip generation rates used for this initial assessment are based upon information collected by City traffic consultants involved in Orange County Great Park traffic analyses, and the San Diego Associated Governments (SANDAG) Guide to Vehicular Traffic Generation Rates (April 2002). These sources include rates that are conservatively higher than Institute of Transportation Engineers (ITE) rates for comparable uses.

For evaluation purposes, two analysis zones are shown on Exhibit 1 for the park with adjacent expansion areas. Zone 1 is the area east of Valley Oak Drive and north of the existing parking spaces located on the south side of the Park entry driveway. Zone 2 encompasses the existing soccer field west of Sand Canyon Avenue, as well as the proposed park expansion area south of the Valley Oak Drive entrance.

Table 1 presents the initial trip generation calculations for zones 1 and 2. Existing Park land uses are estimated to generate 397 daily vehicle trip ends on weekdays, with 16 trip ends during the morning peak hour, and 96 trip ends during the evening peak hour.

Proposed Park land uses are estimated to generate a total of 714 daily vehicle trip ends on weekdays, with 49 trip ends during the morning peak hour, and 100 trip ends during the evening peak hour.

While daily and morning peak hour weekday traffic generation increases significantly in conjunctions with Park improvements, the change in evening peak hour traffic is nominal.

It is important to note that the weekday trip generation associated with park land uses increase significantly on weekend days and holidays.

TRIP DISTRIBUTION AND ASSIGNED VOLUMES

For the purposes of this initial access evaluation, Existing Plus Project development traffic volumes are examined at entries for each of the following options:

- Option A, Valley Oak Drive access only
- Option B, Adding a Right Turns Only Access Driveway Connection to Barranca

The outbound and inbound trip distribution patterns for Option A are shown on Exhibit 6. Equal proportions of Park traffic are allocated to routes serving north, south, east, and west traffic flows.

The outbound and inbound trip distribution patterns for Option B are shown on Exhibit 7. While maintaining the same overall directional orientation as presented for Option A, the volumes are rerouted to consider the new right-turns-only connection to Barranca Parkway.

Exhibits 8 and 9 show the existing plus project weekday AM and PM peak hour intersection turning movement volumes estimated at the Park entrances for Option A and Option B, respectively.

TABLE 1: WEEKDAY PROJECT TRIP GENERATION SUMMARY

Weekday Trip Generation Rates								
		AM Peak Hour			PM Peak Hour			
Land Use	Units	In	Out	Total	In	Out	Total	Daily
Soccer Field[2]	per field	1.29	1.00	2.29	20.00	9.86	29.86	109.00
Baseball Field[2]	per field	1.29	1.00	2.29	20.00	9.86	29.86	109.00
Dog Park[2]	per acre	9.00	6.00	15.00	8.00	7.00	15.00	192.00
Multi Use Active Park[3,4]	per acre	3.25	3.25	6.50	2.25	2.25	4.50	50.00
Multi Use Field[3]	per acre	3.25	3.25	6.50	2.25	2.25	4.50	50.00

Existing Use Trip Generation Results									
			AM Peak Hour			PM Peak Hour			
Land Use	Quantity	Units[1]	In	Out	Total	In	Out	Total	Daily
ZONE 1:									
Soccer Field	1	Field	1	1	2	20	10	30	109
Baseball Field	1	Field	1	1	2	20	10	30	109
Multi Use Active Park[4]	1.4	AC	5	5	10	3	3	6	70
Zone 1 Subtotal			7	7	14	43	23	66	288
ZONE 2:									
Soccer Field	1	Field	1	1	2	20	10	30	109
EXISTING USE TOTAL			**8**	**8**	**16**	**63**	**33**	**96**	**397**

Proposed Project Trip Generation Results									
			AM Peak Hour			PM Peak Hour			
Land Use	Quantity	Units[1]	In	Out	Total	In	Out	Total	Daily
ZONE 1:									
Soccer Field	2	Field	3	2	5	40	20	60	218
Multi Use Active Park[4]	0.9	AC	3	3	6	2	2	4	47
Zone 1 Subtotal			6	5	11	42	22	64	265
ZONE 2:									
Dog Park	2	AC	18	12	30	16	14	30	384
Multi Use Field	1.3	AC	4	4	8	3	3	6	65
Zone 2 Subtotal			22	16	38	19	17	36	449
PROPOSED PROJECT TOTAL			**28**	**21**	**49**	**61**	**39**	**100**	**714**

Trip Generation Comparison Results								
Existing Use		8	8	16	63	33	96	397
Proposed Project		28	21	49	61	39	100	714
DELTA (Proposed - Existing)		**20**	**13**	**33**	**-2**	**6**	**4**	**317**

[1] AC = Acres

[2] Trip Generation Rate Source: Orange County Great Park Development Plan Traffic Study, July 2014. Prepared by LSA Associates, Inc.

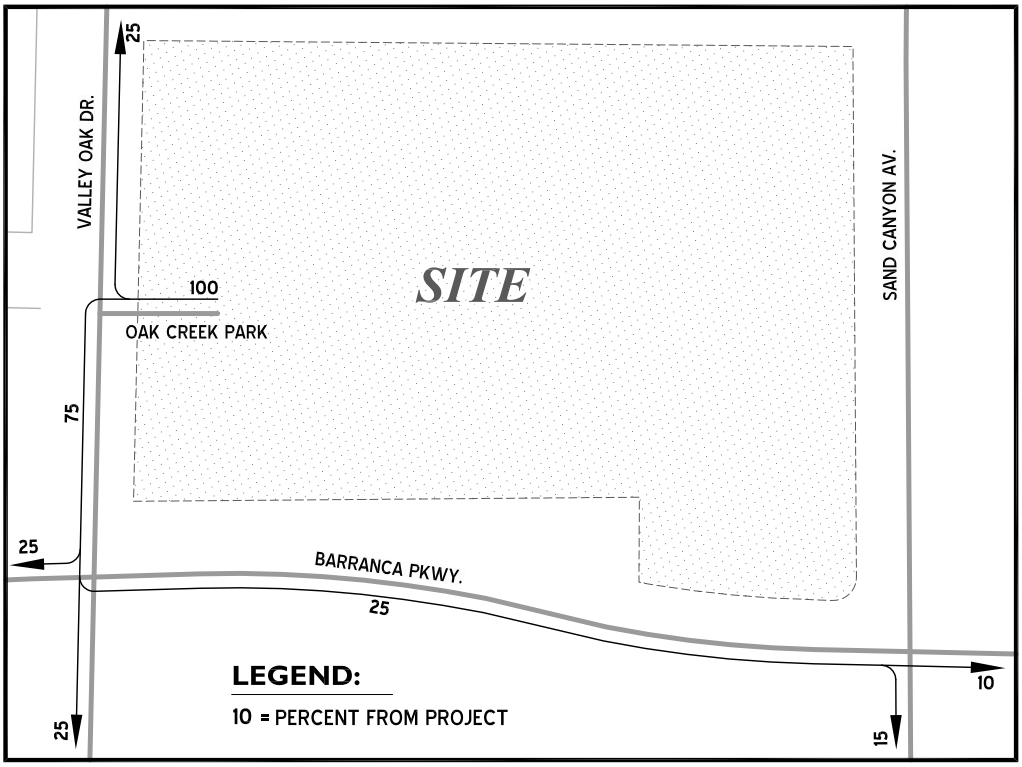
[3] For evaluation purposes, SANDAG's City Park (developed) daily and peak hour rates are utilized for multi-use park.

[4] Multi-use turf, child play area, restrooms, picnic pavilion, and pedestrian walkways

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EXHIBIT 6: OPTION A PROJECT TRIP DISTRIBUTION

OUTBOUND TRIP DISTRIBUTION



INBOUND TRIP DISTRIBUTION

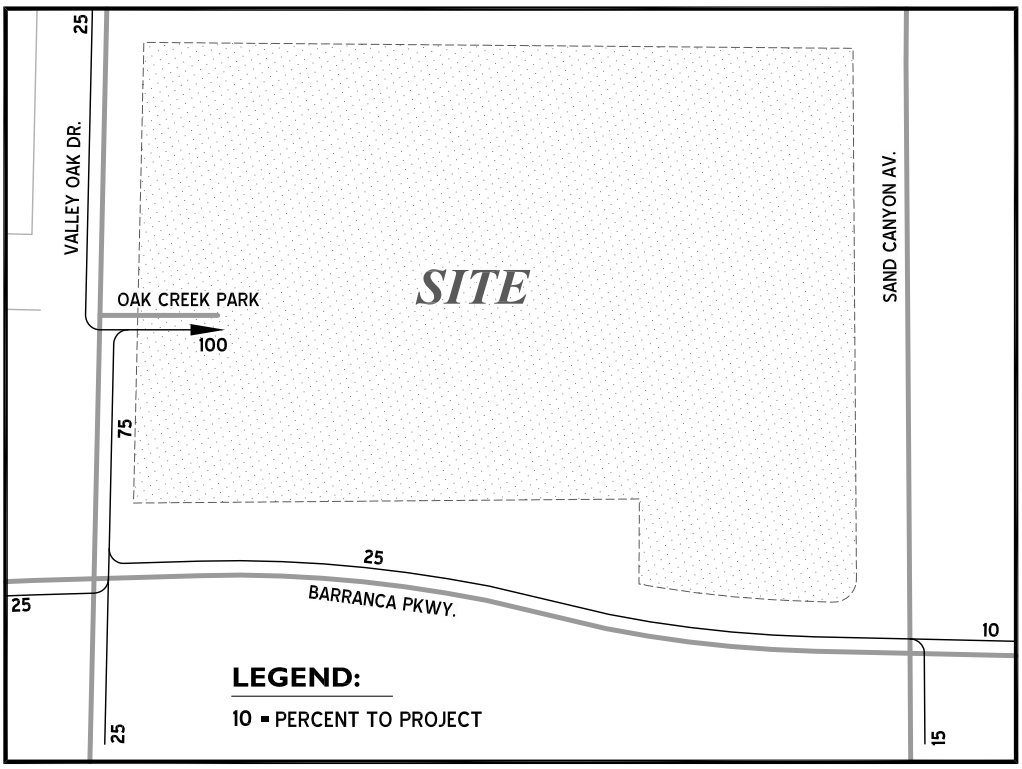
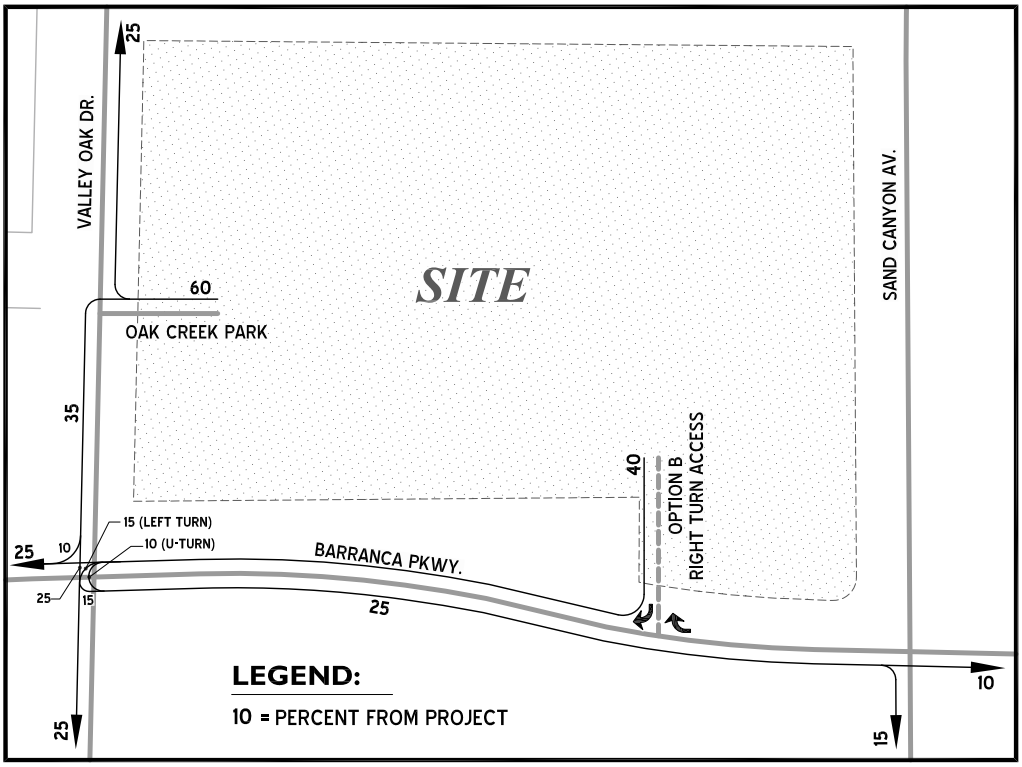


EXHIBIT 7: OPTION B PROJECT TRIP DISTRIBUTION

OUTBOUND TRIP DISTRIBUTION



INBOUND TRIP DISTRIBUTION

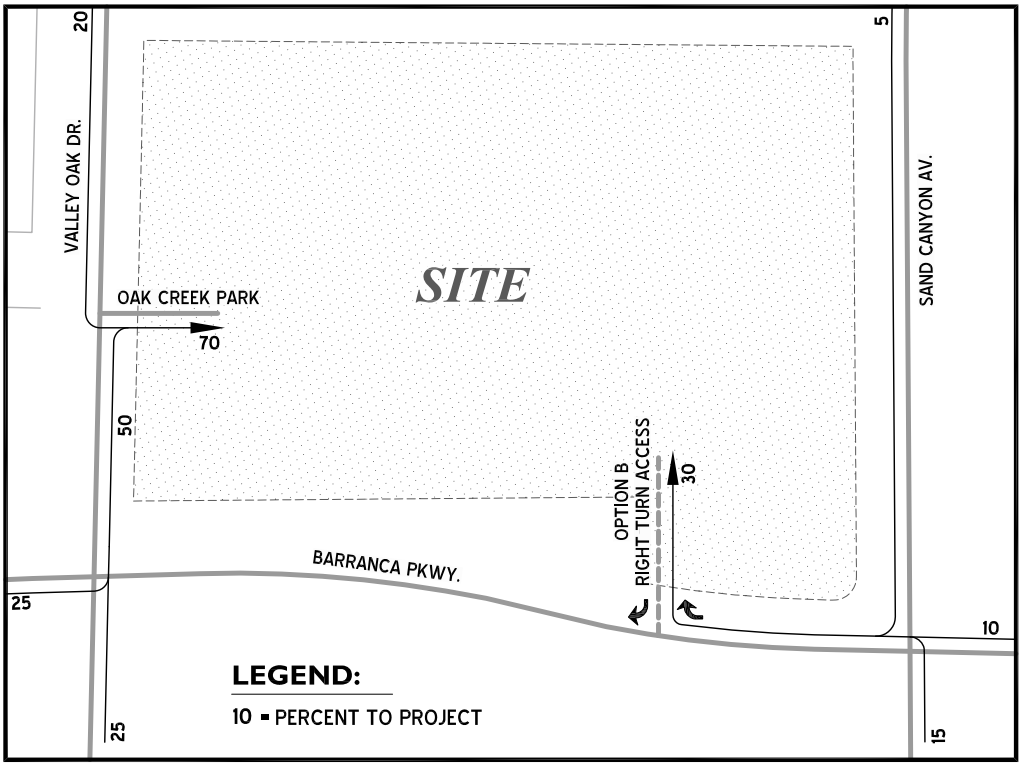
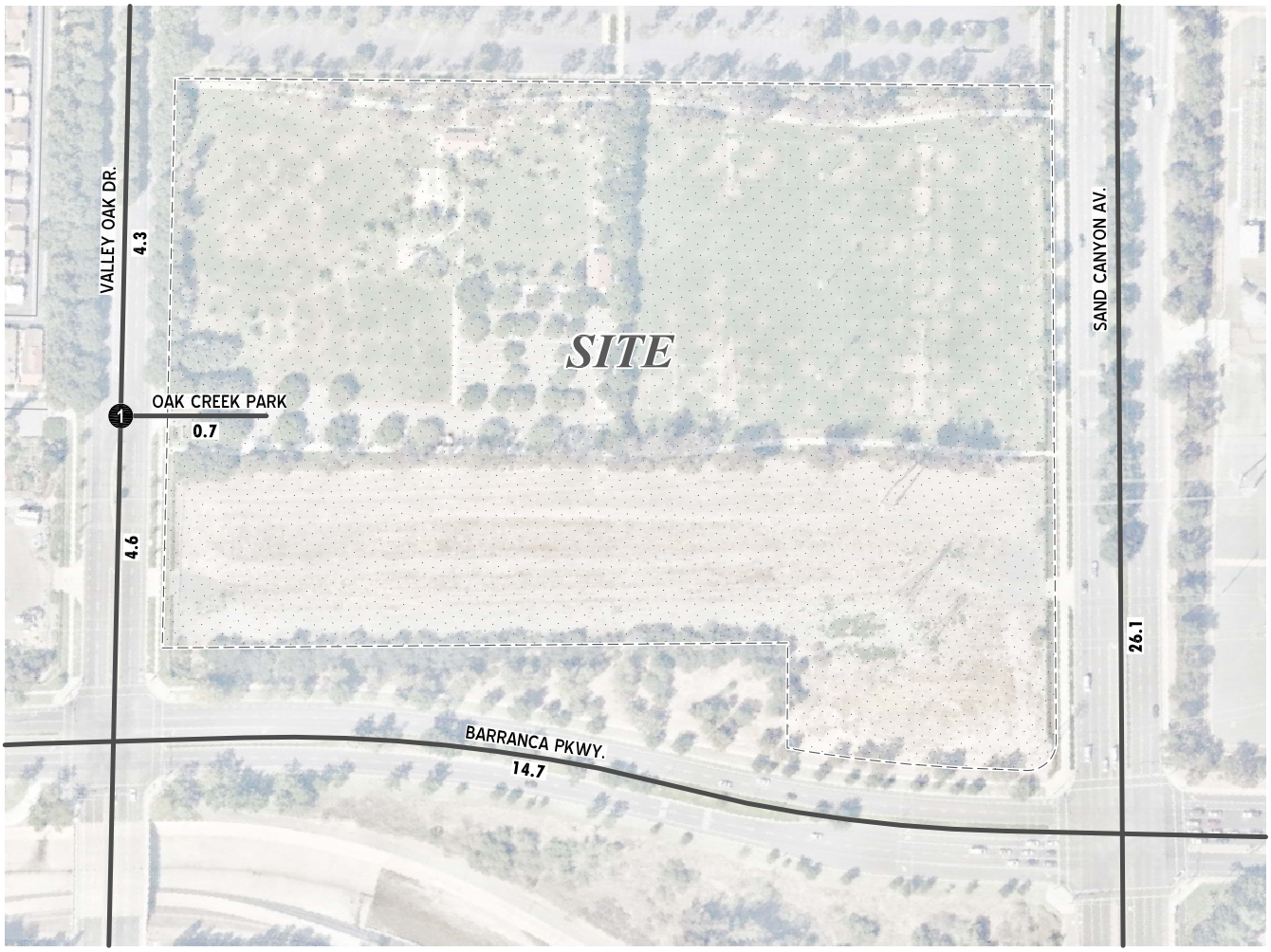
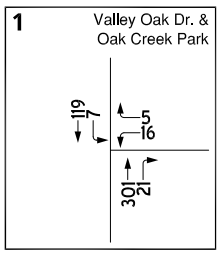


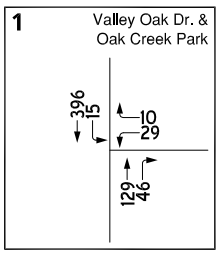
EXHIBIT 8: OPTION A EXISTING PLUS PROJECT VOLUMES AT ENTRANCE



AM PEAK HOUR



PM PEAK HOUR

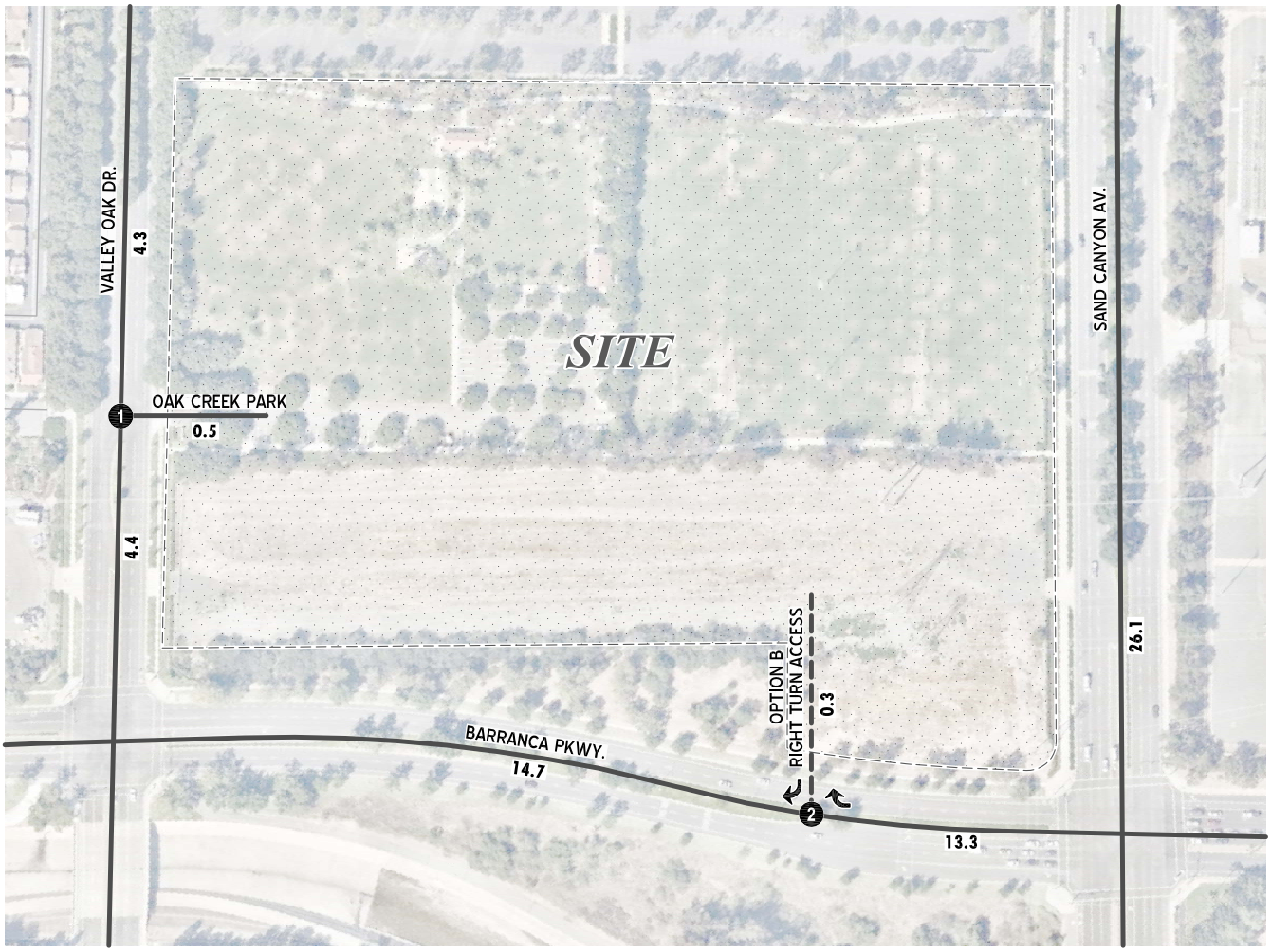


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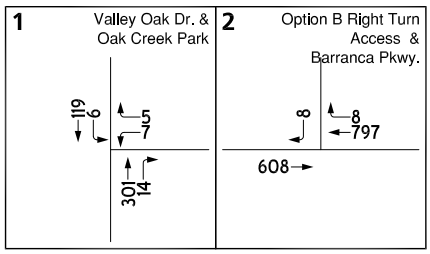
(#) = INTERSECTION ID

10.0 = VEHICLES PER DAY (1000'S)

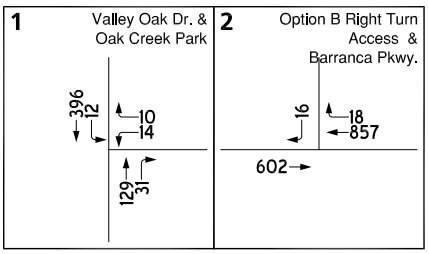
EXHIBIT 9: OPTION B EXISTING PLUS PROJECT VOLUMES AT ENTRANCES



AM PEAK HOUR



PM PEAK HOUR



LEGEND:

- (#) = INTERSECTION ID
- = OPTION B DRIVEWAY (FUTURE)
- 10.0 = VEHICLES PER DAY (1000'S)

Mr. Chris Tiffany
Schmidt Design Group
June 8, 2021

EXISTING PLUS PROJECT TRAFFIC OPERATIONS AT OAK VALLEY DRIVE ENTRANCE

Table 2 summarizes the Valley Oak Drive / Oak Creek Park intersection weekday peak hour level of service (LOS) for weekday morning and evening peak hour conditions with Options A and B. Intersection analysis worksheets are provided in Attachment 1.

For either access scenario, the Valley Oak Drive / Oak Creek Park intersection is anticipated to experience acceptable operations for existing plus project conditions with Park improvements.

INITIAL FINDINGS AND RECOMMMENDATIONS

Although Park volumes are concentrated at the Valley Oak Drive / Oak Creek Park intersection, Option A is an acceptable access scenario with development of the Park improvements. The existing daily traffic capacity on Valley Oak Drive north of Barranca Parkway is approximately 32,000 ADT. Existing traffic volumes on Valley Oak Drive adjacent to the Park are less than 15% of its capacity. This relatively low-background volume condition provides a favorable setting for the Valley Oak Drive / Oak Creek Park intersection to serve Park uses without congestion impacts.

As noted above, trip generation associated with park land uses increase significantly on weekend days and holidays. For Option A, the daily entry volume could increase to more than 2,000 ADT at the Park entrance east of Valley Oak Drive. Peak hour weekend volumes could be over 400 vehicles per hour. Although peak hour vehicle queues can be expected to interfere with some of the parking spaces on the entry driveway east of Valley Oak Drive, any potential back-ups on Valley Oak Drive are ameliorated by the low background volumes on that roadway.

Option B would provide an added outlet for Park traffic, which may be particularly useful during peak weekend conditions. However, a full evaluation of City of Irvine Transportation Design Procedures (TDPs) will be needed if this option is chosen for further analysis.

If you have any questions regarding this initial review of Park access and circulation, please contact John Kain at (949) 375-2435 or Marlie Whiteman at (714) 585-0574.

Respectfully submitted,

URBAN CROSSROADS, INC.

John Kain, AICP
Principal

Marlie Whiteman, PE
Senior Associate

Attachments

TABLE 2: INTERSECTION ANALYSIS FOR EXISTING + PROJECT CONDITIONS

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												OPTION A				OPTION B			
			Northbound			Southbound			Eastbound			Westbound			Delay[2] (Secs)		Level of Service[2]		Delay[2] (Secs)		Level of Service[2]	
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM	AM	PM	AM	PM
1	Valley Oak Dr. / Oak Creek Park	CSS	0	2	d	1	2	0	0	0	0	0	1!	0	11.1	10.9	B	B	10.6	10.3	B	B
2	Option B Right Turn Access / Barranca Pkwy.	**CSS**	0	0	0	0	0	**1**	0	2	0	0	2	d	--	--	--	--	11.4	11.8	B	B

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; d = Defacto Right Turn Lane; **1** = Improvement

[2] Per the Highway Capacity Manual 6th Edition (HCM6), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown. Delay and level of service is calculated using Synchro 10.1 analysis software.

[3] CSS = Cross-street Stop

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ATTACHMENT 1:

EXISTING PLUS PROJECT (OPTION A AND OPTION B) INTERSECTION ANALYSIS WORKSHEETS



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	16	5	301	21	7	119
Future Volume (vph)	16	5	301	21	7	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		50	150	
Storage Lanes	1	0		1	1	
Taper Length (ft)	25				90	
Link Speed (mph)	30		45			45
Link Distance (ft)	171		1026			462
Travel Time (s)	3.9		15.5			7.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						

Intersection Summary	
Area Type:	Other

Intersection	
Int Delay, s/veh	0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	16	5	301	21	7	119
Future Vol, veh/h	16	5	301	21	7	119
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	50	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	5	327	23	8	129

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	408	164	0	0	350	0
Stage 1	327	-	-	-	-	-
Stage 2	81	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	571	852	-	-	1206	-
Stage 1	703	-	-	-	-	-
Stage 2	933	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	567	852	-	-	1206	-
Mov Cap-2 Maneuver	567	-	-	-	-	-
Stage 1	703	-	-	-	-	-
Stage 2	926	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.1	0	0.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	616	1206	-
HCM Lane V/C Ratio	-	-	0.037	0.006	-
HCM Control Delay (s)	-	-	11.1	8	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	29	10	129	46	15	396
Future Volume (vph)	29	10	129	46	15	396
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		50	150	
Storage Lanes	1	0		1	1	
Taper Length (ft)	25				90	
Link Speed (mph)	30		45			45
Link Distance (ft)	171		1026			462
Travel Time (s)	3.9		15.5			7.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						

Intersection Summary	
Area Type:	Other

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	29	10	129	46	15	396
Future Vol, veh/h	29	10	129	46	15	396
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	50	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	32	11	140	50	16	430

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	387	70	0	0	190	0
Stage 1	140	-	-	-	-	-
Stage 2	247	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	589	978	-	-	1381	-
Stage 1	872	-	-	-	-	-
Stage 2	771	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	582	978	-	-	1381	-
Mov Cap-2 Maneuver	582	-	-	-	-	-
Stage 1	872	-	-	-	-	-
Stage 2	762	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.9	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	649	1381	-
HCM Lane V/C Ratio	-	-	0.065	0.012	-
HCM Control Delay (s)	-	-	10.9	7.6	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	7	5	301	14	6	119
Future Volume (vph)	7	5	301	14	6	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		50	150	
Storage Lanes	1	0		1	1	
Taper Length (ft)	25				90	
Link Speed (mph)	30		45			45
Link Distance (ft)	171		1026			462
Travel Time (s)	3.9		15.5			7.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						

Intersection Summary	
Area Type:	Other

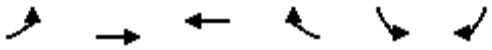
Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	5	301	14	6	119
Future Vol, veh/h	7	5	301	14	6	119
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	50	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	5	327	15	7	129

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	406	164	0	0	342	0
Stage 1	327	-	-	-	-	-
Stage 2	79	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	573	852	-	-	1214	-
Stage 1	703	-	-	-	-	-
Stage 2	935	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	570	852	-	-	1214	-
Mov Cap-2 Maneuver	570	-	-	-	-	-
Stage 1	703	-	-	-	-	-
Stage 2	929	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.6	0	0.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	661	1214	-
HCM Lane V/C Ratio	-	-	0.02	0.005	-
HCM Control Delay (s)	-	-	10.6	8	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	608	797	8	0	8
Future Volume (vph)	0	608	797	8	0	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			50	0	0
Storage Lanes	0			1	0	1
Taper Length (ft)	25				25	
Link Speed (mph)		30	45		30	
Link Distance (ft)		282	341		323	
Travel Time (s)		6.4	5.2		7.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						

Intersection Summary	
Area Type:	Other

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Vol, veh/h	0	608	797	8	0	8
Future Vol, veh/h	0	608	797	8	0	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	50	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	661	866	9	0	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	433
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	571
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	571
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	571
HCM Lane V/C Ratio	-	-	-	0.015
HCM Control Delay (s)	-	-	-	11.4
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	14	10	129	31	12	396
Future Volume (vph)	14	10	129	31	12	396
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		50	150	
Storage Lanes	1	0		1	1	
Taper Length (ft)	25				90	
Link Speed (mph)	30		45			45
Link Distance (ft)	171		1026			462
Travel Time (s)	3.9		15.5			7.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						

Intersection Summary	
Area Type:	Other

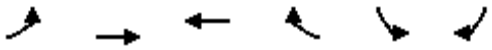
Intersection	
Int Delay, s/veh	0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	14	10	129	31	12	396
Future Vol, veh/h	14	10	129	31	12	396
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	50	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	15	11	140	34	13	430

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	381	70	0	0	174	0
Stage 1	140	-	-	-	-	-
Stage 2	241	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	594	978	-	-	1400	-
Stage 1	872	-	-	-	-	-
Stage 2	776	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	589	978	-	-	1400	-
Mov Cap-2 Maneuver	589	-	-	-	-	-
Stage 1	872	-	-	-	-	-
Stage 2	769	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.3	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	706	1400	-
HCM Lane V/C Ratio	-	-	0.037	0.009	-
HCM Control Delay (s)	-	-	10.3	7.6	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	602	857	18	0	16
Future Volume (vph)	0	602	857	18	0	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			50	0	0
Storage Lanes	0			1	0	1
Taper Length (ft)	25				25	
Link Speed (mph)		30	30		30	
Link Distance (ft)		282	341		323	
Travel Time (s)		6.4	7.8		7.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						

Intersection Summary	
Area Type:	Other

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Vol, veh/h	0	602	857	18	0	16
Future Vol, veh/h	0	602	857	18	0	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	50	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	654	932	20	0	17

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	466
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	543
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	543
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	11.8
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	543
HCM Lane V/C Ratio	-	-	-	0.032
HCM Control Delay (s)	-	-	-	11.8
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.1

Appendix I VMT Screening Analysis

Appendix

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September 21, 2021

Mr. Chris Tiffany
Schmidt Design Group
1310 Rosecrans Street, Suite G
San Diego, CA 92106

SUBJECT: OAK CREEK PARK VEHICLE MILES TRAVELLED (VMT) SCREENING ANALYSIS

Dear Mr. Chris Tiffany:

This letter provides the vehicle miles travelled (VMT) screening analysis associated with proposed improvements for the Oak Creek Community Park, located north of Barranca Parkway, west of Sand Canyon Avenue, and east of Valley Oak Drive in the City of Irvine.

PROJECT DESCRIPTION

Existing uses at the Oak Creek Community Park included two soccer fields, one baseball field, and 1.4 acres of multi-use turf, restrooms, picnic pavilion, and pedestrian walkways. Proposed improvements to the Oak Creek Community Park include the addition of a dog park, rearrangement of the active use fields, and additional parking spaces.

Parks provide gathering places for nearby residents and employees, families, and social groups, as well as for individuals of all ages and economic status, regardless of their ability to pay for access. Community parks serve the local population in a manner similar to public schools.

Parks and recreation programs provide places for health and well-being that are accessible by persons of all abilities, especially to those with disabilities.

VMT SCREENING

City of Irvine CEQA VMT IMPACT ANALYSIS GUIDELINES stipulate that "If an analysis of environmental impacts related to transportation (i.e., VMT impact analysis) is required for a discretionary project, but the project applicant demonstrates to the satisfaction of the Director of Public Works and Transportation (or assigned staff under the direction of the Director) that the project meets any one of the following four screening criteria, then no further VMT impact analysis is required:

1. The project results in a net increase of 250 or less weekday daily trips (based on latest edition of the ITE Trip Generation Manual or other sources acceptable to the City).

2. The project is located in a High Quality Transit Area or Priority Transit Area (i.e., within half-mile distance of existing rail transit station or located within half-mile of two or more existing bus routes with a frequency of service interval of 15 minutes or less during morning and evening peak hours), with specified density and parking features and if consistent with the applicable Sustainable Communities Strategy.

3. The project consists of 100-percent restricted affordable housing units.

4. The project is **locally serving such as 100,000 square feet or less of retail use, a daycare use or a locally serving public school** (kindergarten through 12th grade)."

Public parks are not intended to be the focus of CEQA VMT analyses: "…land uses such as **public facilities, recreation and parks are generally perceived as community-serving and not independent trip generators on the scale of residences or workplaces**." (City of Irvine SB 743 Implementation – Technical Appendix, Iteris, Page 11).

Proposed improvements to the Oak Creek Community Park are locally serving. They expand upon the existing park activities by accommodating pet owners who live or work nearby and adding parking spaces for the transport of pets to the park. It is appropriate to classify these improvements as locally serving, and no further VMT impact analysis is required.

For independent trip generators that are not screened out, the project's analysis of resulting VMT rate must be evaluated and compared against the applicable adopted VMT rate threshold, using the City's VMT traffic model (ITAM TransCAD 2018 VMT).

For non-residential projects (i.e., office, industrial, retail greater than 100,000 total gross square feet, hotels, hospitals, commercial recreation, university uses), the VMT per employee specific to a project is calculated by the project's contribution toward countywide commute and other related VMT (i.e., customer and client) divided by the project's contribution toward an increase in the number of employees.

The Oak Creek Community Park improvements do not measurably increase the number of employees located on-site.

In addition, the non-residential VMT per employee rate is 31.0 for the ITAM traffic analysis zone that encompasses the Oak Creek Community Park. This is significantly less than the City's adopted non-residential VMT rate threshold of 41.36 VMT per employee.

FINDINGS & CONCLUSIONS

Proposed improvements to the Oak Creek Community Park are locally serving. They expand upon the existing park activities by accommodating pet owners who live or work nearby and adding parking spaces for the transport of pets to the park.

The non-residential VMT per employee rate for the ITAM traffic analysis zone that encompasses the Oak Creek Community Park is significantly less than the City's adopted non-residential VMT rate threshold.

Like local shopping areas and public schools, the proposed Oak Creek Community Park improvements can be presumed to have a less than significant impact on VMT.

If you have any questions regarding this assessment of VMT screening for the Oak Creek Community Park, please contact John Kain at (949) 375-2435 or Marlie Whiteman at (714) 585-0574.

Respectfully submitted,

URBAN CROSSROADS, INC.

John Kain, AICP
Principal

Marlie Whiteman, PE
Senior Associate